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ABSTRACT

This document is the first in a series of three documents, which together contains 27 case studies on the uses of cost analysis in educational planning. The case studies have been presented to help planners and administrators see how cost analysis can be used to improve the efficiency of their educational systems, or how to get the best value from existing resources. The ten case studies included in this first volume include cost analysis of education in Asia, Thailand, Ceylon, Tanzania, and the USSR. Other topics considered include the use of capital costs in educational planning in France, factors influencing change in teachers' basic salaries in Tanzania, economic planning and the financing of higher education in the USSR, and evaluating the expansion of a vocational training program in Chile. (Author/DN)

Titles in the series

Educational cost analysis in action: case studies for planners—I

Tanzania: planning for implementation/Tanzania: factors influencing change in teachers' basic salaries/Ceylon: costing first- and second-level general education/USSR: economic planning and the financing of higher education/USSR: estimating the annual budget requirements of the educational system/France: the use of capital costs in educational planning — the case of the Fifth French Plan/Thailand: educational cost analysis/Thailand: the use of cost analysis in estimating the total cost of an educational plan and testing its feasibility/Asia: cost analysis in an Asian model of educational development/Chile: evaluating the expansion of a vocational training programme

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Published separately

***Managing educational costs* by Philip H. Coombs and Jacques Hallak**

A synthesis report on the IIEP research project. Part I presents highlights of the 27 case studies; Part II provides some basic insights into the nature and behaviour of educational costs that are prerequisite to the practice of cost analysis; Part III gives a wide variety of guides, practical tips and precautions for applying cost analysis in particular situations. (Note: This volume is published by Oxford University Press, New York, London and Toronto).

Educational cost analysis in action: case studies for planners—I

*An IIEP research project directed by
Philip H. Coombs and Jacques Hallak*

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
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Preface

During the Second United Nations Development Decade most countries, whether industrialized or 'developing', will be facing increasingly pressing financial strain in meeting their enormous and urgent needs in the realm of education.

Both planners and administrators will in future have to take into greater account the economic aspects involved in their plans, and explore every means of improving the efficiency of their educational systems so as to get the best value from existing resources. Experience has proved that an indispensable technique for this purpose is analysis of the costs of education, by means of which it is possible to:

- check the economic validity of educational plans;
- draw up a precise programme of expenditure over the planning period;
- estimate both the costs and the real economic consequences of specific projects;
- facilitate decision-making when several alternative possibilities exist for the allocation of funds.

To illustrate these techniques as clearly as possible the International Institute for Educational Planning (IIEP) put in hand, in 1968, a large-scale research project on the uses of cost analysis in educational planning. The aim of the study was to carry out a pragmatic inquiry into actual practice in order to provide planners with a general view of the various ways of using cost analysis and with practical hints on the application of these ways to their own particular needs. Mr. Philip H. Coombs, the former Director of the Institute, was responsible for the technical direction of the work, assisted by Mr. Jacques Hallak, also of the Institute, and with the co-operation of a number of IIEP staff members; the project took over two years and was carried out in three stages.

In the first stage, a methodological note was prepared, laying down the general lines on which the research would be carried out. As many examples as possible of experiences in this field were considered, from which a diversified sample of 27 cases was selected for study in depth.

The second stage was to gather and analyse the statistical information for each case in this sample, and to compile an analytical report based on the data collected for each case study. For these activities the IIEP was greatly

assisted by the co-operation of specialists in the various countries and of international experts, especially those of Unesco.

In the third stage the guidelines and principal lessons emerging from an analysis of all the case studies were summed up by Mr. Coombs and Mr. Hallak in a synthesis report (which is being published separately).

The project was financed principally by the United States Agency for International Development (USAID) and the Swedish International Development Authority (SIDA), to whom the IIEP wishes to express its deepest gratitude. The Institute would also like to thank the many officials, educators, and specialists who, both in the countries studied and in the various Departments of Unesco, have unstintingly given us their assistance in bringing this project to fruition. Responsibility for the content of all reports, however, rests with the authors named.

RAYMOND POIGNANT
Director, IIEP

An introductory explanation

The twenty-seven case studies carried out by the IIEP on the uses of cost analysis in educational planning are extremely diversified in every respect. They are widely scattered geographically; they are fairly well distributed by level and type of education or training (the two notable deficiencies being teacher training and non-formal education); they vary in breadth of coverage, ranging from individual projects to entire formal educational systems; and, most important, they illustrate the diversity of uses to which cost analysis can be put.

Broadly speaking, the cases illustrate seven principal purposes which cost analysis can serve: (1) costing and testing the economic feasibility of educational plans; (2) evaluating and improving the allocation of available educational resources (e.g. by principal levels and types of education); (3) weighing the comparative advantages of alternative ways to pursue the same educational objectives; (4) determining both the short- and long-term cost implications of a particular project; (5) estimating the introductory costs and the likely longer-term cost impacts of a major educational innovation; (6) conducting a general search for ways to improve efficiency and productivity; and (7) checking the economic implications and feasibility of special policy decisions before they are made.

The case studies can also be usefully classified from a different angle, according to three degrees of educational change involved: (1) the linear expansion of an existing educational system or sub-system without substantial change in its characteristics (the simplest case); (2) significant modifications of existing educational arrangements aimed at improving the qualitative performance and efficiency of the system, but still without radically altering its form and methods (decidedly more difficult); and (3) fundamental innovations aimed at drastically altering the system's structure, content, and performance, or even creating alternative teaching-learning 'systems' to replace or supplement the old ones (the most complex case).

About half of the case studies were prepared entirely by IIEP staff members from original documentation, supplemented where necessary by field visits. The rest were prepared under IIEP guidance by outside consultants with first-

hand knowledge of the case in question. The descriptions of the authors given at the opening of each case study refer to the positions they held at the time the studies were prepared.

As might be expected, the cases vary greatly in the amount of evidence available, in the simplicity or sophistication of the methods employed, and in the amount they have to teach to others. Interestingly, when we checked the complete cases with experienced people, there was wide agreement that the 'thin' cases (in terms of the spareness of data available and the crudeness of the method used) were often the most instructive, because educators in other countries could most readily identify their own situation with them.

These cases, it should be emphasized, are not offered as models to be emulated. In fact in no few instances the chief lessons are, in a sense, negative ones; the greatest value lies perhaps in the analysis of the shortcomings of the methods used and in the suggestions of alternative methods that *might* have been used. But above all, the cases lend an air of reality to the whole subject. They demonstrate to the hard-pressed and hard-headed administrator who has grown sceptical of abstract theorizing that his colleagues elsewhere, with problems rather similar to his own, have actually made a stab at cost analysis with useful practical results. Hopefully such an administrator will browse through a few of these cases himself and be inspired to try a few stabs of his own.

P.H.C. AND J. H.
Paris, 1972.

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Tanzania

1

Planning for implementation

prepared by Nicholas Bennett

This study was prepared by Mr. Nicholas Bennett of the IIEP with the assistance of Mr. Michael J. Kinunda of the Tanzanian Ministry of education. The author and the Institute gratefully acknowledge the helpful co-operation of the Ministry of education of the Tanzania in providing the basic data for the study.

Introduction

The first Tanzanian five-year plan marked a distinct step forward in planning in the African context. It made use of new techniques and methodologies rarely used in Africa before. In this study we are concerned with those lessons learnt during the implementation of the plan which might be useful to other countries; there were both strengths and weaknesses in the planning process which, with the advantage of hindsight, we can point out for the benefit of other countries who find themselves in a similar position.

The IIEP has already published a great deal on planning in Tanzania¹ and the costing of the first educational plan 1964/65–1968/69². However, it was felt that it would be useful and interesting to compare the preparation and implementation of the first plan with the subsequent preparation of the second five-year plan.

Tanzania is one of the few newly independent countries which has carried its theoretical commitment to planning into action. The educational plan, part of the 1964/65–1968/69 development plan, was largely implemented in terms of enrolment targets. Secondary and higher education expanded to meet the country's estimated manpower requirements, and enrolments at the primary level increased at roughly the rate anticipated. This expansion took place despite severe financial restraints.

In this paper we will concentrate on the financial aspects. In the first part we will briefly outline the costing procedures followed in preparing the plan. In the second part we will compare the original costing of the plan with actual costs, concentrating on the recurrent costs of primary education and on the capital costs of secondary education expansion. In the third part we will discuss the lessons learnt.

As regards primary education, attention will be drawn to the cost implications of the changes envisaged in the structure of the system, the upgrading of the teaching force and the changes in pupil/teacher ratios. We will also briefly touch upon an interesting method of financing primary education capital development by local authorities and the new policy of self-reliance.

As far as secondary education is concerned, we will show the need for project planning and for imposing strict space standards in planning the construction of new schools or streams.

Finally, we will draw conclusions that might be useful for other countries at a similar stage of development. It is perhaps useful to summarize these conclusions at the outset:

1. A. C. Mwingira and S. Pratt, 'The process of educational planning in Tanzania', in *Educational development in Africa*, Volume I, Paris, Unesco : IIEP, 1969.
G. Skorov, 'Integration of educational and economic planning in Tanzania', in *Educational development in Africa*, Volume III, Paris, Unesco : IIEP, 1969.
2. J. B. Knight, 'The costing and financing of educational development in Tanzania', in *Educational development in Africa*, Volume II, Paris, Unesco : IIEP, 1969.

1. In calculating unit recurrent costs, changes in teacher qualifications and experience must first be estimated.
2. When structural changes to a system are being considered, their full cost implications must be known by the policy makers.
3. Before capital expenditure is undertaken in any type of institution, the use made of existing space at similar institutions should be studied.
4. Capital costs of programmes must be based on complete and thorough costing of the projects that make up the programme, on the basis of fixed space and buildings standards.
5. Not too much dependence should be placed on foreign aid.

I. The educational plan 1964/65-1968/69

A. The educational plan as part of the total plan

The Tanzanian five-year plan 1964/65-1968/69 marked the first stage in a long-term perspective plan which aimed to increase *per capita* GDP¹ from its 1960-62 average of £19.6 to £45.1 by 1980.² There were, of course, other objectives, in particular the policy of ensuring that Tanzania becomes self-sufficient in high-level manpower by the end of the perspective planning period, that is by 1980.

To achieve the long-term objectives, a rate of growth of GDP of 6.7 per cent per annum was planned (8.5 per cent in the monetary sector). It was estimated that a total gross fixed capital formation of £253 million in the monetary sector would be required (including a carry-over of £7 million from the previous plan). Direct central government development expenditure of approximately £79 million was planned for, including foreign aid, plus £10 million local government expenditure, £30 million parastatal, and £18 million East African Common Services Organization. Thus 54 per cent of the planned gross fixed capital formation was directly or indirectly under government control.

Direct government capital expenditure was planned to rise from £7.26 million in 1963/64 to £18.19 million in 1968/69, a rate of growth of 20.2 per cent per annum. Over the same period central government recurrent expenditure was planned to increase from £27.12 million to £41.58 million, a rate of growth of 8.9 per cent per annum.

It was anticipated that overseas sources would provide 78 per cent of central

1. GDP = gross domestic product.

2. The Tanzanian unit of currency is the shilling (Tan. shs.) but the pound (£) is often used: 20 Tan. shs. = £1.0 Tan.

Rate of exchange US \$1 = £0.35.

government development expenditure and 93.5 per cent of expenditure on social infrastructure, under which head education accounts for about half.

Table 1 shows how education's share of direct government capital (excluding parastatal investment) and government recurrent expenditure was forecast to change over the plan period.

TABLE 1. Government recurrent and direct capital expenditure, showing amounts and percentages for education (£ millions)

Financial year	Recurrent			Direct ² capital		
	Education	Total	Percentage	Education	Total	Percentage
1955/56	2.67	18.49	14.4	0.67	4.08	16.4
1963/64	4.94	27.12	18.2	1.06	7.26	14.6
1964/65	5.93	32.94	18.0	2.29	14.77 ¹	15.5
1968/69	8.36	41.58	20.1	3.58	18.19	20.2
1964/65-1968/69 total plan ³	35.51	185.56	19.1	14.40	79.37	18.1

NOTES 1. No published documents appear to include the phasing of the £7 million carry-over. This figure is therefore our own estimate, assuming most of the carry-over will be spent in the first two years of the plan.

2. It was thought more appropriate to omit expenditure on the parastatal organizations, as these are meant in the long run to be self-financing.

3. Slightly different figures for these totals exist in different published documents. These are the totals from volume II of the second plan, including the carry-over from the previous plan.

SOURCE J. B. Knight, op. cit.

United Republic of Tanganyika and Zanzibar, *Tanganyika five-year plan for economic and social development, 1964-69*, Dar-es-Salaam, Government Printer, 1964.

An 8.5 per cent growth rate for monetary GDP has rarely been achieved by countries at a comparable level of development. Coupled with the planned growth in government expenditure of 11.7 per cent annum from 1963/64 to 1968/69 and an expected aid financing of 78 per cent, it is clear that the planners were extremely ambitious in their aims.

The proportion of the plan which was expected to be financed by aid was the most dubious aspect. Many projects which were important in the eyes of the Tanzanian authorities were not necessarily attractive to aid donors because of their low import content and, in any case, most aid donors are usually willing to finance only part of the cost of a project. The figure of 93.5 per cent for capital expenditure on social services was very optimistic; the experience of other African countries suggested that a figure of 50 per cent would have been a more realistic aim.

Education was considered by the Tanzanian planners not as a social investment but as a necessary infrastructural investment. Thus the expansion of primary education (in the past considered as not producing definite returns in itself) was to be held back as much as possible, while secondary and higher education were to be expanded at exactly the rate needed to fulfil the country's estimated manpower needs.

The educational plan, given the ambitious targets of the over-all plan, appeared reasonable. The percentage of planned government expenditure going to education was not rising at a very rapid rate, and the level planned to be reached in 1968/69 could not be considered particularly high compared with that in a number of other African countries.

B. Target setting

In mid-1963 the Tanzanian Ministry of education was asked by the Ministry of development planning to prepare an educational plan for the period July 1964 to June 1969. The main aims were (a) the achievement of the manpower targets set by the Ministry of development planning and (b) the development of a balanced educational system based on sound professional standards.

At this stage the Ministry of education was asked *not* to take account of potential financial scarcities but simply to draw up a plan that in their eyes would best satisfy the above criteria.

Secondary, technical and higher education enrolments were to be based on manpower projections (shown in table 2). From these figures educational flow charts were constructed. Account was taken of drop-outs (15 per cent from form I to form IV) and failures (60 per cent of form V entrants were expected to pass the higher school certificate examination at the end of form VI).¹ Table 3 summarizes the results of these calculations.

This is not the place to discuss the arguments for and against using manpower projections as a basis for educational planning, nor the techniques used. However, as the secondary and higher education programmes were based almost entirely on manpower projections, some observations should be made:

- (a) the rate of wastage of 4 per cent per annum assumed for Tanzanians in high-level posts was perhaps on the high side, as the age profile of Tanzanians is likely to be strongly weighted in favour of the younger age groups;
- (b) the ratio of stocks of class A: class B: class C manpower existing at the time of the manpower survey was projected to remain roughly constant even though this ratio was probably not optimum. The current situation might have been sub-optimum because of the large proportion of expatriates in high-level posts, there being little difference between the total cost of employing a class A expatriate and that of employing a class B. Class A expatriates were recruited when, at local salary levels, a class B person might have been employed;
- (c) at the class A level it was assumed in the projections that expatriates would be replaced by Tanzanians, even though a considerable shortage was anticipated at this level. It might have been wiser to adjust all the controllable variables on the projection so that the expected shortages would be as small as possible;

1. Secondary education in Tanzania is divided into six forms: forms I-IV make up lower secondary education and forms V-VI higher.

TABLE 2. Estimated manpower requirements, 1970 and 1980

Items	Period/year	Estimation I ²			Estimation II ²			1964 survey ³ 1964/65-1965/69		
		Class A ¹	Class B ¹	Class C ¹	Class A	Class B	Class C	Class A	Class B	Class C
Employment in base year	1962	3 350	2 220	24 140		3 750	23 010	2 801	6 555	20 910
Net increase	1962-1970	1 900	1 740	16 660	not changed	4 000	14 000	1 758	3 210	12 898
Replacement needs ⁴	1962-1970	1 280	710	6 260		1 235	5 735	1 147	2 568	4 364
Gross requirements	1962-1970	3 180	2 450	22 920		5 235	19 735	2 905	5 778	17 262
Net increase	1970-1980	3 990	4 380	37 800	not changed	12 390	41 718	—	—	—
Replacement needs	1970-1980	1 520	950	10 140		2 420	8 940	—	—	—
Gross requirements	1970-1980	5 510	5 330	47 940		14 810	50 658	—	—	—

1. Class A: Occupations requiring a university degree or equivalent.

Class B: Occupations requiring 2-3 years' training or education after successful completion of form IV (lower secondary school).

Class C: Occupations requiring four years' secondary school education or equivalent.

2. Estimation I shows the original Ministry of planning projections, whilst estimation II is a Ministry of education revision including provision for the upgrading of the primary teaching force. A larger proportion of the primary teaching force have been included under class B and a smaller proportion under class C manpower in estimation II than in estimation I. The employment in the base year for class B and C for the two estimations is not the same due to more up-to-date statistics being used in estimation II. The third column refers to a different survey carried out in 1964.

3. In this survey, private commerce was excluded and agriculture was substantially limited to government employment. In industry generally, the impact of small firms was estimated, but not ascertained in the survey. However, none of these omissions was likely to make a significant difference to demand for high-level manpower in class A or B.

4. Including normal wastage due to death and retirement, and special wastage due to Tanzanianization.

SOURCE Ministry of Education (unpublished data) and *First Five-year plan*, op. cit. United Republic of Tanzania. *Second five-year plan for economic and social development*, 1969-74, two vols. Dar-es-Salaam, Government Printer, 1969.

Educational cost analysis in action: case studies for planners

TABLE 3. Enrolments and classes in secondary education: draft plan¹

Forms	Items	1964	1969	1962/69	
				Planned output	Requirements
I	Enrolments	5 250	7 070		
	Classes ²	150	202		
IV	Enrolments	3 540	5 117		
	Classes ²	119	172		
	Output class C to meet gross requirements ³	2 240	2 977	19 074	19 735
I to IV	Classes ²	553	748		
V	Enrolments	680	1 280		
	Classes ⁴	34	64		
VI	Enrolments	520	1 080		
	of which HSC passes	312	648		
	Classes ⁴	26	54		
	Output class B to meet gross requirements ³	508	1 132	5 266	5 235
	Output class A to meet gross requirements ³		480	1 495	3 180

1. These enrolments are based on the Ministry of education revision of the manpower projections.
2. An intake of thirty-five per class assumed at form I, with a normal progression of classes and 15 % wastage between form I and form IV. However, in 1964 secondary school fees were to be abolished, and hence it was expected that the wastage would be less, thus the cumulative output from 1962 to 1969 was set slightly under the manpower projection figure.
3. Output class C includes total output less those required to go on to further education, output class B includes only those who have failed the HSC examination and those pursuing other forms of post-secondary education, whilst output class A assumes that all those passing HSC in year n will successfully complete university in year $n + 3$.
4. At the form V and form VI level the figures refer to a planned size of subject groupings of twenty per group, with no drop-out between form V and form VI.

SOURCE Ministry of education draft plan.

(d) no account was taken of the fact that the manpower survey had only partially covered the different classes of high-level manpower.

In addition, some of the assumptions made in converting the manpower projections into educational enrolments may well have led to an under-estimation of the latter:

- (a) except at the form VI level, no allowance was made for students failing the final examination;
- (b) except at the form I-IV level, no allowance was made for drop-outs;
- (c) it was assumed that students graduating from form VI in year n would graduate from university in year $n + 3$, whereas in no case could they graduate before year $n + 4$. This is because the university academic year begins seven months after the end of the secondary school year. Many professional and overseas courses take more than three years, and the average time spent between leaving form VI and graduating is nearer five years than three;

(d) no allowance was made for students continuing with postgraduate studies.

Thus it is likely that both the supply and demand for class A manpower was over-estimated, that the supply of class B manpower was over-estimated and the demand under-estimated, and that consequently the demand for class C manpower was under-estimated (as more form IV leavers would be needed to go on to higher education).

However, the manpower projections and the enrolments based on them as shown in table 3 remained unchanged throughout many revisions of the plan.

The targets for primary education were not directly related to manpower targets, and the decisions taken were based on social, political and financial considerations.

Firstly, it was decided that the percentage of 6-year-olds entering standard I¹ should not fall substantially during the plan period. This entailed increasing intakes into standard I by 10,000 to 146,000 between 1964 and 1969, an increase of 1.5 per cent per annum, compared with a growth of the school-age population of about 2.5 per cent per annum.

Secondly, it was decided that half-day teaching in standards III and IV should be rapidly abolished.

Thirdly, it was decided that the barrier between standard IV and standard V should be lowered so that by 1969 half those in standard IV could proceed to standard V, compared with only one-third in 1963.

Fourthly, to increase the enrolments at standards VII and VIII, the barrier after standard VI was to be removed. It was hoped that increased numbers receiving standard VIII education would make it possible for secondary school enrolments to fall from the level of 1 in 3.2 to 1 in 4.6 by 1970. The intention was to enable greater selectivity to be practised in secondary school enrolments. Table 4 shows the structure of the primary education system in 1963.

TABLE 4. Primary education: number of classes by standard, 1963

	Std. I	II	III	IV	V	VI	VII	VIII
Part-time	3 227	3 161	1 156	1 135				
Full-time			1 905	1 905	933	755	516	467
TOTAL	3 227	3 161	3 061	3 040	933	755	516	467

NOTE For every twelve standard I classes there were approximately four part-time and eight full-time standard III and IV classes, four V's, three VI's and two standard VII and VIII's.

Lastly, it was decided that the quality of the primary school teaching force should be improved by phasing out the training of grade C teachers so that all new teachers would be grade A (as soon as the supply of form IV leavers was sufficiently large).² The qualifications of the teaching force had to be improved because

1. Classes in primary schools are known as standards. In 1963 there were eight standards. In the first two and some of the third and fourth only half-day instruction was provided.

2. Three grades of primary teacher are employed in Tanzanian primary schools: grade A teachers with two years' training after form IV; grade B, from 1964 a promotion grade but previously two years' training after form II; and grade C requiring two years' training after standard VIII.

(a) the proportion of higher classes was to increase, and higher classes require better-qualified teachers; and (b) the length of the full course was to be shortened from eight to seven years, in order to fit the same content into a shorter period, and better quality teachers would be needed.

Because of lack of agreement at the governmental level on these targets, the final published plan gave no quantitative targets for enrolments at the primary level. The rate of expansion of primary education was to a large extent to depend on the local authorities' ability to finance such expansion. The central government was to concentrate its attention on (i) abolishing the barrier after standard VI, (it had been agreed that the primary course should be shortened from eight to seven years, and so standard VIII was abolished); (ii) abolishing half-day teaching at standards III and IV; (iii) upgrading the teaching force, particularly in rural areas and (iv) helping those local authorities in whose area under half the age group were entering standard I to increase the intake at this grade.

Thus, the plan for primary education, though not quantified, concentrated on giving those children likely to go to school a longer time at school, with more remaining to the end of the course, taught by better teachers. Little was to be done for those children who were not likely to go to school.

C. Recurrent costing

1. *Primary*

The costs of primary education in the final plan were calculated on the basis of the ministry's staffing policy in 1962 and the average cost per teacher at each grade. Entry to standard I was to increase by 2,000 per annum and the average cost per pupil was expected to rise by 2 per cent per annum at standards I to IV, due to higher teachers' salaries.

Half-day classes at standards III and IV were to be turned into full-day classes at the rate of 400 classes per year. Intake into standard V was planned to increase by about 5,000 per annum and the average cost per pupil was expected to rise by 3 per cent per annum in standard V/VII. All new places were to be day places.

The authorities were wise to cost the expansion at each standard separately. For example Knight (op. cit.) calculated that the cost per pupil in 1963 varied from £3.7 per day pupil in standards I and II to £18.2 per day pupil in standards VII and VIII. However, no attempt was made to economize by increasing average class size and no real attempt was made to calculate the change in average teachers' salaries due to the changing age/experience structure of the teaching force.¹

In 1964 average salaries of teachers were falling, due to a rapidly expanding teaching force and consequently a rising proportion of younger teachers, and the original estimates were cut by £1.98 million. Teaching costs account for between 75 and 80 per cent of total instructional cost of primary education, and the

1. See J. D. Chesswas, *Tanzania: factors influencing change in teachers' basic salaries*, p. 37.

enrolment targets for the different standards were uncertain. Thus, by far the most accurate way of forecasting the recurrent costs of primary education would have been to make projections of the primary level teaching force, making certain assumptions about wastage and the output of the teacher-training colleges. Changes in the average teacher's place on the salary scale have considerable effect on salary costs.

2. Secondary

The method of projecting secondary school recurrent costs was roughly similar to that for primary education, at least as far as teacher costs were concerned. In 1962 the teacher local salary cost (that is, excluding overseas additions, etc.) was £50 per pupil in forms I-IV, with an average class size of thirty-five. This entailed a teacher cost per class of £1,750. On top of this was added £360 per class non-teacher tuition costs and £875 per class boarding costs. Again it was assumed that there would be an incremental creep in these costs of 2 per cent per annum. The same procedure was followed for forms V and VI.

The total recurrent cost figures were then worked out for each year of the plan multiplying the number of classes at each level by the cost of each class.

This method of costing was perhaps even less satisfactory than the method used for primary education, as it ignored changes in teachers' experience structures and changes in the qualifications of the teaching force.

Again, far more reliable results would have been obtained had the structure of the teaching force been estimated and from this the total salary bill, including the expatriation costs to be met by the Tanzanian government, calculated.

As in the case of primary education, costs in 1964 were falling and the 1964 costs per class were projected forward instead of the 1962 costs. Using 1964 costs as a basis there would be a saving of £0.4 million during the plan period. In view of this, £1 million (9 per cent) was arbitrarily cut off the original total recurrent cost estimate for the whole of the plan period.

3. Other

Recurrent expenditure on teacher training was calculated in the same way as for secondary education, in this case assuming an incremental creep of 3 per cent per annum from the 1962 base year.

It was planned to increase enrolments at the grade A level from 270 in 1963 to 3,000 in 1969, and to phase out grade C level from 1,433 to zero over the period. In such circumstances this method of costing was not very useful. It is perhaps acceptable for marginal changes but constitutes no more than a rough guess when a major structural change is planned.

As far as technical education was concerned, at the time the plan was published it had not been decided what increases in enrolments should take place. The recurrent cost estimate could be only a rough approximation.

In planning higher education the educational planners had the benefit of a

report of the University Grants Committee of the University of East Africa setting out estimated expenditure and revenue in considerable detail for the period 1964/65-1966/67. In addition to the report's estimated cost per student certain allowances had to be added which were paid either directly to the student or for his welfare (such as the residence fee, grants for clothing, books, etc.).¹ It was decided that if the total cost per student at the University of East Africa could not be reduced below £850² by 1967, then the intake of Tanzanians into Dar-es-Salaam university college would be held at 450 per annum and all students above this number would be sent abroad. This was because the cost of sending students abroad at government expense was estimated to be £850 per annum. Otherwise no students would be sent abroad at government expense.

D. Capital costing

It was assumed that capital costs were unlikely to be a constraining factor. During all the discussions between the Ministry of development planning and the Ministry of education the emphasis was on recurrent costs, since much of the capital was expected to come from foreign aid sources.

It was estimated that the capital cost per new classroom constructed (including teachers' quarters) at the primary level would be:

Standards I and II	£1,000
Standards III and IV	£2,000
Standards V and VI	£2,300
Standards VII	£4,000

About half this capital expenditure was expected to be financed from central government sources. Such a level of capital expenditure was distinctly higher than absolutely necessary, and no doubt reflected the Ministry of education's instruction not to take account, at the preliminary stages of planning, of potential financial constraints. However, as the current level of central government assistance for capital development at the primary level was only £50 per class in rural areas, these estimates were too high and were subsequently reduced. The original estimate of £12.8 million for the whole programme was cut to £5 million, only £2.7 million of which was to be provided by the central government. Nevertheless, the level of financial assistance planned was considerably higher than had been the case in the past.

It is usually cheaper to add a new stream to a secondary school than to build an entirely new school. Thus, though no project costing was carried out during the preparation of the plan, new schools were costed separately from the addition of extra streams to existing schools. All new places to be constructed during the plan period were to be boarding places.

1. See N. Bennett, *Uganda: the use of cost evaluation in the planning of Makerere University College*, in volume III in this series.

2. It is not clear whether this figure refers to the total cost or to the total cost to be met by the Tanzanian government.

In 1963 the addition of a new boarding stream to a secondary school (forms I-IV), cost an average of £58,800. It was felt that by reducing standards somewhat this figure could be brought down to an average of £55,000 over the plan period, despite expected rises in buildings cost. The cost of a new stream at the higher secondary school level was estimated to increase from £46,000 in 1963 to an average of £47,500 over the plan period.¹

The cost of building an entirely new two-stream secondary school (forms I-IV), was estimated to be £163,000 and that of a three-stream school (forms I-IV with two streams at forms V-VI), £245,000.

TABLE 5. Planned cost per place of secondary school expansion, 1964-69

	Total cost (£)	Number of places ¹	Cost per place (£)
One-stream, forms I-IV	55,000	140	393
New school, 2-stream forms I-IV	163,000	280	582
Four forms, forms V-VI	47,500	80	594
New school, 3-stream forms I-IV four classes, forms V and VI	245,000	500	490

1. Assuming thirty-five per class forms I-IV and twenty per class forms V-VI, i.e. no drop-outs.

As the capital cost per place of adding to existing schools was considerably less than that of building new schools, on purely economic grounds there was little justification for building several new schools, particularly two-stream schools, which were the most expensive form of construction. The decision was based, however, not on economic grounds but on a policy of regionalizing entry into secondary schools. According to this policy students would, whenever possible, attend secondary boarding schools in their own region. If the cost implications of this administratively desirable policy had been fully appreciated the policy would perhaps have been modified.

It was realized that the unit costs on which the plan was based were on the high side, and it was decided to seek expert advice on reducing them. It was hoped that this advice would permit a saving of £250,000 out of the total projected expenditure on secondary education of £3,191,000, roughly an 8 per cent saving.

A suggestion was put forward during the formulation of the draft plan that boarding secondary schools should be run for two sessions a day. If this proposal had been adopted, no new secondary schools need have been planned. Extra dormitory and staff housing accommodation would have had to be added to existing schools, but 50 per cent of the planned capital expenditure could have been saved.²

1. The entire five-year plan was on a constant cost basis; it was consciously assumed that any cost increases, therefore, would have to be applied throughout the plan period.

2. The costs of constructing a double-session school were estimated to be 50 per cent higher than for a single-session school (see Knight, *op. cit.*). However, as no new schools need have been built the savings would have been even greater than the 50 per cent implied.

The capital costs of the expansion of grade A teacher training were based on the plans made in 1963 for a college with an intake of 240 students at a capital cost per student of £800.

The expansion of technical education and of the university college of Dar-es-Salaam were based on rough project estimations.

II. Implementation of the 1964/65-1968/69 plan

A. The over-all plan

There was a dramatic change in the market price for Tanzania's major export crop, sisal, during the plan period (the price fell by about 35 per cent between 1964 and 1965). Nevertheless, the rate of growth of the economy was 5 per cent per annum, no mean achievement in the circumstances.²

Total government recurrent expenditure in 1968-69 was marginally above the level planned. Gross fixed capital formation over the plan period ran at about 90 per cent of the level planned (in money terms). Central government development expenditure was approximately 80 per cent of that planned. In real terms, though, both gross fixed formation and central government development expenditure were considerably lower than planned because of a rapid increase in construction costs during the first two years of the plan. However, only 34.5 per cent of the development expenditure was financed from foreign sources, compared with the 78 per cent planned.

Nevertheless, in addition to the creditable rate of growth, gross fixed capital formation as a percentage of monetary GDP rose from its 1963 level of 14.5 per cent to around 22 per cent in 1968-69. Important structural changes also took place. Banks and insurance companies were nationalized and new ideologies formulated.

B. The educational plan

Broadly speaking, the educational plan was implemented; at almost all levels the planned intakes and enrolments were achieved. At the primary level, for which no targets were included in the final plan and for which most of the financial resources were to come from the local authorities, even the draft plan enrolment figures were exceeded. Table 6 shows the expansion of intakes by level.

1. Compared with the 6.7 per cent planned.

TABLE 6. Planned and actual enrolments

	1963 actual	1964 actual	1968 actual	1969 estimate	1969 actual
U.E.A.	109	175	534	528	565
Form V	297	604	1 265	1 280	1 362
Form I	4 972	5 302	7 028	7 070	7 110
Grade A teacher-training	180	290	1 100 ¹	1 500	200
Grade C teacher-training	700	860	160 ¹	—	240
Standard VII leavers ²	17 000	20 350	54 000 ¹	45 000	59 000
Standard V	40 000	44 000	63 000 ¹	71 000 ³	69 000
Standard I	136 000	140 000	160 000	160 000	163 000

1. Estimates.

2. Standard VIII leavers before the changeover.

3. Draft plan figure, no figure given in the final plan. Final plan target appeared to be considerably below the 71,000.

SOURCE *First five-year plan*, op. cit.*Second five-year plan*, op. cit.Ministry of education, *Annual report of the ministry of education*, Dar-es-Salaam, various years.Ministry of education, *Draft educational plan*, mimeo.

Author's estimates.

It can be seen from this table that only at the grade A teacher-training level was there a serious shortfall in meeting targets, and this was because of a change in policy during the plan.

The percentage of total government revenue devoted to education fell during the plan period from 18.2 per cent in 1963/64 to 16.4 per cent in 1968/69. However, if one excludes the consolidated fund services (mainly debt servicing), which had been rising very rapidly, educational expenditure as a percentage of government expenditure remained constant over the plan period at approximately 20 per cent.

There were, of course, other sources of recurrent revenue for the grant-aided system: fees paid by students, contributions by voluntary agencies, and contributions by local authorities towards the cost of running primary schools.

1. Recurrent expenditure

Even though the educational system expanded at a rate slightly faster than planned, the increase in enrolments was achieved at an increased cost roughly at the rate planned for central government recurrent expenditure. Further, this was achieved despite the fact that there was a substantial increase in the salary scales of primary teachers in 1965, (7 per cent for grade A, 10 per cent for grade B and 15 per cent for grade C). Thus it can be seen that the unit recurrent cost figures used in preparing the draft plan substantially exceeded the actual costs, but the total recurrent expenditures adopted in the final plan approximated the actual total outlays.

Although fees for secondary education were abolished in 1964, they are still an important source of revenue at the primary level. They constitute between 5 and 15 per cent of total approved expenditure, depending on the standard and the area. More important, however, are the local authorities' contributions towards primary

TABLE 7. Recurrent expenditure, education (draft plan, plan and actual) 1964/65-1968/69 (thousands of £, figures rounded to nearest £50,000)

	1964/65	1965/66	1966/67	1967/68	1968/69
Draft plan	9 400	10 500	11 500	12 800	14 000
Plan	5 950	6 500	7 050	7 650	8 350
Actual	5 800	6 600	7 150	7 900	8 600

NOTE Although the Tanzanian planners often talk in terms of 'total recurrent expenditure over the plan period', we do not consider this to be a useful concept as recurrent expenditure, unlike capital, cannot usually be carried over from one year to the next.

SOURCE Ministry of education, *Draft educational plan*, mimeo.
First five-year plan, op. cit.
 United Republic of Tanzania, *Estimates of revenue...* and *The appropriation accounts...* for relevant years. Dar-es-Salaam. Government Printer.
 United Republic of Tanzania, *A mid-term appraisal of the achievements under the five-year plan, 1964-69*, Dar-es-Salaam. Ministry of economic affairs and development planning. 1967.

education. These had more than doubled between 1962 and 1964¹ and were planned to increase during the plan period at about 10 per cent per annum. Though no exact statistics are available it seems likely that local authorities' contributions increased even more rapidly—at something over 15 per cent per annum—and almost half the expenditure on primary education was financed by local authorities in 1968/69. The percentage of local authorities' revenue spent on education increased rapidly between 1961 and 1965, from 18.4 per cent to over 47 per cent, and since then appears to have remained fairly stable.²

However, because of the increasing proportion of primary school expenditure financed by local authorities, the proportion of government recurrent expenditure on education declined.

TABLE 8. Percentage of gross government recurrent expenditure on education going to different types of education

	Central government			
	Actual 1964/65	Actual 1966/67	Estimate 1968/69	Plan 1964/69
Primary	45.1	42.3	39.1	36.9
Secondary/technical	30.7	31.3	30.5	33.2
Teacher training	8.2	8.0	8.0	9.1
Higher	7.8	10.8	15.0	12.4
Administration	8.2	7.6	7.4	8.3

SOURCE *First five-year plan*, op. cit.
Estimates of revenue..., op. cit.

Table 8 read in conjunction with table 7 shows that although in over-all terms government recurrent expenditure increased at the rate planned, in terms of

1. Local authorities' financial years are calendar years, while the central government financial year is from July to June.

2. Only approximate figures can be given when talking about local authorities as accurate time series of financial data are not available.

1. Tanzania: 1

individual levels expenditure in certain sectors increased more rapidly than planned and in other sectors less rapidly.

From the estimates it is impossible to make meaningful unit cost calculations, as the categories are too broad. Nor is it possible to compare the recurrent cost of implementation of the plan with the planned figures, as the published plan gave only the total recurrent costs over the plan period for each sector of education. Only the total figure for education was broken down by year. Thus it is not possible to draw definite conclusions, except in the broadest terms, about the recurrent costs in the implementation of the plan.

It is apparent from the above tables that recurrent costs in secondary and technical education were considerably lower than planned. However, from table 6 it can be seen that both at the form I and form V level intakes were higher than planned. Thus it can be deduced why the unit costs of secondary and technical education were lower than planned.

At first sight one would perhaps have expected the unit costs of secondary education to have risen during the plan period. Not only did the proportion of non-graduates in the teaching force fall from almost 32 per cent in 1964 to about 25 per cent in 1969, but the student/teacher ratio also decreased slightly in the same period (from 23.3:1 in 1964 to 21.8:1 in 1969). In spite of these factors the per-pupil teacher costs met by the Tanzanian government (excluding overseas addition payments) fell by about 5 per cent. This fall in per-pupil teaching costs was due partly to increasing numbers of Tanzanians joining the teaching force at the bottom of the salary scale (Tanzanians constituted 26.3 per cent of the teaching force in 1964, 34.6 per cent 1968 and 48.7 per cent in 1969), partly to the replacement of long-serving permanent and pensionable expatriates by short-service relatively inexperienced contract officers (again paid at the bottom of the scale), and partly to the influx of overseas volunteer teachers and aid personnel who cost the Tanzanian government considerably less than their full salary.

It is not possible to draw any conclusions as to the accuracy of the cost calculations for primary education, because the original calculations did not take into account the increase in teachers' salaries, teachers' qualifications, and structural changes. The removal of the barrier at standard VI was achieved, but not that at standard IV. Half-time teaching at standards III and IV was abolished as planned.

As regards teacher training and higher education, unforeseen developments during the plan period again prevent one from drawing conclusions.

It should be noted from the above tables that administrative and overhead costs were held below the planned level, despite the fact that in over-all enrolment terms the system expanded slightly more than planned and that substantial changes were made in curriculum and content.

Two policy changes took place during the plan period and should be mentioned. Both were intended to help reduce unit costs, at least marginally.

The first was the founding of Tanzania Elimu Supplies, a parastatal organization given the monopoly of supplying books and materials to primary schools. It was hoped that such an organization would be able to reduce the costs of school materials by about 10 per cent. As expenditure on materials is itself only 10 per cent

of total approved expenditure on primary education, the costs of primary education were unlikely to be reduced by more than 1 per cent. None the less, the organization could make an important contribution to improving instructional materials.

The second was the introduction of an entirely new educational philosophy, as outlined in *Education for self-reliance*.¹ The idea behind this new philosophy was that the educational system should be designed in such a way as not to produce a separation between the educated élite and the uneducated masses. To this end not only were there to be considerable changes in the primary school curriculum to make what was taught in school more applicable to Tanzanian conditions, but also many school children were to participate both in productive activities (in order to make their schools more self-sufficient) and in community activities. Thus most schools were to have school farms, which the children would cultivate as part of their normal school activities. So far these activities have not enabled the government to reduce its contribution to primary education, but the revenue from the farms has been used to provide better equipment for the schools and sometimes towards providing the children with a midday meal.

The self-reliance policy was also introduced into secondary schools in 1967. At that time it was hoped that the revenue from the school farms and the savings from students taking-over of the tasks carried out by unskilled staff (cleaning buildings, upkeep of grounds, etc.), would enable government subventions to be reduced by about £5 per pupil per annum. In the early years these savings were not attained. Some observers have felt that the financial gap between secondary school costs per pupil and income *per capita* in the country as a whole (boarding costs alone exceed average *per capita* income) is so large that it cannot be bridged by a few hours' manual labour or community participation and five 'self-reliance' periods a week.

It is really far too soon to try to appraise the results of the self-reliance programme, particularly in financial terms, but the early indications are that, especially at the primary level, it is helping to bridge the gap between the educated and uneducated.

An innovation in very much the same spirit during the plan period concerned primary school capital construction. The central government decided to supply local authorities with pre-fabricated primary classroom kits at a cost of about £250 per classroom. The local authority would then supply the labour and some materials, to the value of £250-£350, and a good permanent classroom would be constructed. Pre-fabricated kits for building teachers' houses were also sometimes provided. In this way the central government ensured that capital subventions for primary education were in fact used for constructing schools and houses of a reasonably high standard.

While on the one hand the Tanzanian government was trying to effect marginal reductions in the unit costs of primary and secondary education through the policy of self-reliance, two policies relating to secondary education introduced at the

1. Julius K. Nyerere, *Education for self-reliance*, Dar-es-Salaam, Government Printer, 1967.

beginning of the first five-year plan period tended to produce the opposite effect: (a) the decision to abolish secondary school fees from 1964; and (b) the decision to concentrate all expansion of secondary schools in boarding schools.

The revenue from school fees was £234,000 in 1963 and would, if the same system had been continued, have risen to approximately £400,000 in 1969. A reasonably successful scheme of fee remission in operation prior to 1964 had helped reduce hardship cases. Though, of course, it is not possible to have a completely just form of fee remission, the case could, nevertheless, be made that school fees are probably an easier and more efficient way of collecting revenue for the government than an equivalent tax.

Tanzania, unlike many other African countries, has a selection procedure for allocating primary school leavers to secondary schools which ensures that children normally go to a secondary school within their home district.¹ Thus many children attend secondary schools either near their homes or near the homes of relatives, and it is not therefore essential that schools should provide exclusively for boarders.

2. Capital costs

While actual recurrent costs were very much in line with those planned, the same was not true for capital costs, either in over-all terms or at the individual project level.

It is difficult to assemble all the capital expenditures on education under one head, because in some cases aid donors contributed directly to projects and also because there were some multi-departmental experimental projects² financed from a combination of budgets.

Bearing in mind these qualifications, table 9 shows the initial draft plan capital expenditure estimates and an estimate of actual expenditures.

TABLE 9. Planned and actual capital expenditure by central government (including aid) on education, 1964-69 (thousands of £ rounded to nearest £50,000)

	1964/65	1965/66	1966/67	1967/68	1968/69	Total
Draft plan	4 200	4 500	4 400	4 250	4 050	21 400
Plan	2 300	2 300	2 700	3 400	3 700	14 400
Actual	2 150	2 200	1 000	1 500 ¹	1 650 ¹	8 500

1. Estimates.

SOURCE Estimates, revenue statements, *Five year plan*, Vo. II; *Draft educational plan*, op. cit.

Thus in money terms only about 60 per cent of the projected capital expenditure in the final plan took place. Table 10 compares planned capital expenditure with actual expenditure for the first, middle and final years of the plan.

1. In Uganda, for instance, secondary school selection takes place on a national basis so that each school has an enrolment from throughout the country.

2. At Kibaha, for example, a project supported by the Nordic countries, there is a secondary school, a health training centre and also some community development premises.

TABLE 10. Planned and actual central government capital expenditures by broad sector (thousands of £)

	1964/65			1966/67			1968/69		
	Planned	Actual	Percentage	Planned	Actual	Percentage	Planned	Estimate	Percentage
Primary	340	124	36.5	540	110	20.4	677	108	16.0
Secondary	957	597	62.4	544	199	36.6	400	708	177.0
Technical	35	59	168.6	399	—	0	416	36	8.7
Teach. train.	400	316	79.0	400	81	20.3	450	720	160.0
Higher	523	1 061	202.9	767	—	0	1 562	50	3.2
Other	35	—	0	50	—	0	175	—	0
TOTAL	2 290	2 157	94.2	2 700	1 013	37.5	3 680	1 622	44.1

SOURCE *Second five-year plan*, Vol. II, op. cit.
Estimates of revenue..., op. cit.

It can be seen that, looking at each sector of the educational system separately, there was little relationship between planned and actual expenditure.

Though some time-lags and bottlenecks can be expected in implementing any plan, the difference between the planned and actual expenditure was, in this case, much greater than one would ordinarily expect.

III. Lessons learnt from implementation

A. The lessons

The general lesson learnt by the Tanzanian authorities during the implementation of the first five-year educational plan was that the educational policy-makers were not presented with sufficient information on the cost implications of the changes they wished to make. It was not until severe problems arose because of lack of financial resources that the cost implications of the policies adopted came to light.

The four basic policy changes decided upon for primary education had much greater effects on recurrent costs than had been anticipated.

Firstly, the policy of upgrading the teaching force (replacing grade C teachers by grade A) proved expensive. The mid-point of the grade A salary scale was £418 per annum, and that of grade C £277 per annum, a difference of £139. The starting and finishing points on the scales were even further apart.¹ Thus the financial implications of this change in policy were very serious. In 1964 the output of grade A teachers was about 180, by 1969 it was planned to be about 1,500. If it had

1. See Chesswas, op. cit.

been planned to produce only 300 grade A teachers and 1,200 grade C; the costs of primary education would have risen by about £180,000 less than they were planned to.

Secondly, the policy of abolishing the barriers at standards IV and VI was designed to increase the proportion of pupils in the higher grades of primary education. Apart from the direct effects of the increased numbers remaining at school, more grade A teachers were needed at the higher grades. If the structure had not been changed grade C teachers would have sufficed.

Thirdly, the abolition of half-time education at standards III and IV increased the need for teachers.

Fourthly, the planned increase in the number of teachers per full-time class from 1.023 in 1963 to 1.333 had important cost implications. In 1963 the forty-three classes of primary standards I to VI (the structure based on twelve standard I classes) required forty-three teachers, of whom seven should have been grade A whereas only two in fact were; while by the end of the plan period it was intended that there would be sixty-eight teachers (1.333 teachers per class) for the fifty-one classes in the new structure. All the new teachers were supposed to be grade A (including replacements for retiring grade C teachers), and so of those sixty-eight teachers at least thirty-six would have to be grade A.¹

If for simplicity we take the average salary of grade A to be 1.5 times the average salary of grade C, the teacher salary costs would be 85 per cent higher with these new policies than if the old policies and structure had been maintained (95 per cent higher than the actual situation in 1963).

Had it been realized that qualitative and structural changes were being planned which would, if implemented, have almost doubled the recurrent cost of each child entering the system at a time when half the children in the country were not receiving any schooling, the decision taken might have been different. If the planners had fully costed all the above proposals thoroughly they would have realized that if the existing structure had been maintained, universal primary education could almost have been achieved by the end of the plan period.² The essential point is that whatever choice the policy-makers made, it would at least have been made on the basis of complete information.

In fact during the plan period it was realized that all the qualitative proposals could not be carried out. As a result, the cost to the government per standard I entrant was likely to increase by only 47 per cent between 1963 and 1970 (about 10 per cent of this due to the unforeseen increase in teachers' salaries), and not by the 90-95 per cent that the proposals would have entailed.

On the capital cost side, the first five-year plan considerably over-estimated the need for central government financing of primary education. The planners underestimated the willingness of local communities to build classrooms and even

1. In 1963, for each standard there were forty-one grade B or C teachers and two grade A: With a wastage rate of 4 per cent per annum, only thirty-two grade B or C teachers would be left. All new teachers were to be grade A, which means that there would be thirty-six grade A teachers by the end of the plan period.

2. At least for standard I-IV enrolment.

teachers' houses. In countries where there is clear social pressure for the extension of the educational system this is a factor which should be borne in mind by the central authorities.

Important lessons were also learned in the costing of capital development at the secondary level regarding the use of existing facilities and the building of new schools and extensions to schools.

At the time the first plan was published no project analysis had taken place; there were no fixed space standards and no inventory of existing facilities. The capital cost figures in the plan were based on two assumptions: (a) that all schools were working at full capacity, using every available facility to the optimum; and (b) that building costs were the same throughout the country. The planners realized that these assumptions were merely first approximations, and they assumed that there was considerable potential for saving from the greater use of existing buildings and the imposition of space and building standards for new buildings. They guessed that £250,000 could be saved over the plan period and invited a Unesco mission to Tanzania in November 1965 to study the problem.

The report of the mission¹ analysed the existing secondary school facilities, made proposals as to how these facilities could be utilized more intensively, if somewhat radical changes in time-tabling were made, and suggested space, lighting, ventilation and other standards for new buildings. For example, with radical changes in time-tabling, teaching spaces could have been used 50 per cent more than currently.

The Tanzanian government adopted the general recommendations of the report, which in fact formed the basis of all space calculations in subsequent projects. Thus the mission did much useful work. The first full inventory of secondary school facilities was made and school construction standards set. Both these were, of course, essential for future planning. As already discussed, the facilities constructed during the plan period were considerably fewer than planned; many schools were therefore forced to increase the utilization of their buildings, and in this respect the recommendations of the Unesco mission helped them.

Table 11 shows the considerable variation in the cost per place of secondary schools constructed during the first plan period. It should be noted that only in those schools which were built roughly to the standards laid out in the Unesco report did the cost per place bear a close relationship to the planned figures.

Of the four schools shown in table 11 two, Tanga and Korogme, were built to government space standards. The table shows that if fixed standards are applied very large economies can be made.

Kibaha, by far the most expensive of the schools, was financed jointly by the four Nordic countries as part of a multi-institutional project. As it was financed entirely from external sources the Tanzanian government did not try to exercise control over the facilities to be provided, and they were thus more expensive than those of other secondary schools.

1. C. Fera, F. Scriven and J. Soulat, *Tanzania: secondary schools facilities inventory*, Paris, Unesco, 1967 (restricted).

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TABLE 11. Planned and actual capital cost per place for the construction of selected new secondary schools:¹ First five-year plan

	Plan		Kibaha ²	Galanos ²	Tanga	Korogme
Cost per place	£490	£582	£1 480	£715	£565	£560
Planned total enrolment	500	280	564	280	360	500

SOURCES *First-year plan, op. cit.* Nordic Board Evaluation Mission on Kibaha 1968. 1967 *Educational statistics*, mimeo.

NOTES 1. The actual capital expenditure at these schools has been adjusted to include all planned facilities, even if some of the facilities were not actually constructed.
2. Both Kibaha and Galanos were gifts to the Tanzanian government, Kibaha from the Nordic countries, and Galanos from a Greek planter.

The creation of an institution such as Kibaha, with much better facilities than existing schools, at a time when the Tanzanian government was beginning to try to enforce strict space and building standards, had some potential disadvantages. Having seen the facilities at Kibaha, school administrators might be even more unwilling to accept the new standards.

The capital development programme of the first five-year plan was not a success. More information was needed by the planners as to the use being made of existing facilities—whether school intakes could be increased by making adjustments, whether additional streams could be added to schools rather than building new schools, etc. Furthermore, where new schools were necessary they were not planned according to fixed standards. Only over-all estimates of the expansion of facilities were made. Capital costs ought to have been calculated on a project basis, to make sure that the best use was made of scarce resources.

The Tanzanian authorities had hoped for a great deal of financial assistance from abroad for capital development. Aid flows fell well below expectations and the capital programme suffered. Educational projects are, unfortunately, all too often less attractive to aid donors than, for example, industrial projects (which usually have a high import content), and the Tanzanian government learned this lesson the hard way.

B. Application of the lessons in the second plan

The experience gained during the first plan period led to a re-appraisal of objectives and planning methodology in formulating the second five-year plan, 1969–74. The cost implications of many desirable changes were such that a different attitude had to be adopted towards the educational system.

In particular the attitude towards primary education saw a shift of emphasis. For most pupils in Tanzania primary education is terminal, those going on to secondary education constituting a small minority. Hence, in the second plan the Tanzanian planners decided that the main function of primary education would be

to educate those children for whom it would be terminal; to this end, for example, the medium of instruction in the higher standards was changed from English to Swahili.

During the preparation of the second plan much attention was paid to the cost implications of various proposals. Different proposals put forward, all roughly in the same cost bracket, included a scheme for universal primary education, standards I to IV, by 1989. In the end it was decided to aim for universal standard I to VII education by 1989. But in contrast to the decisions taken when drawing up the first plan, this decision was made on the basis of carefully costed alternative proposals.

The Tanzanian policy-makers continue to believe that a child cannot be given a meaningful education in four years and that all children entering school should complete standard VII. However, to enable the children leaving school at standard VII to use more productively what they have learnt at school, the age of entry into primary school has been increased from 6 to 7, so that children leave school nearer the age when they will begin productive work themselves.

Though it was realized that the qualitative improvements would delay the attainment of universal primary education by a decade or so, it was felt that such improvements, though increasing unit costs per entrant, would, combined with curriculum changes and the raising of the age of entry, produce very positive returns.

The qualitative improvements which had been planned for the first plan period and which had proved too ambitious were modified in the second plan. In fact, towards the end of the first plan period steps were taken to reduce costs. Firstly, it was decided to reduce intakes into grade A teacher-training colleges from a planned 1,500 in 1969 to 740 in 1970, to re-start the training of grade C teachers at a more rapid rate than ever before, and to introduce a new low grade of teacher, grade D, requiring only one year's training and paid slightly more than the minimum wage (£120 per annum).¹ Secondly, it was realized that, given the pressure for expansion of primary education, it would not be possible in the foreseeable future to provide 1.333 teachers per class.

As regards capital costing, £0.9 million was included in the second five-year plan for improving and expanding the facilities at schools for which no increase in enrolments were planned. Part of this sum was to be used for constructing new specialist facilities. However, the general costing lesson which had been learned from the first plan was to a large extent applied.

The capital costs of the second plan were based on a study of individual projects, and not merely on over-all estimates. Fixed standards were to be applied to new constructions. Table 12 shows the costs per place that were calculated.

1. Grade D has now virtually been assimilated to grade C and occupies the grade C salary scale, on the basis that it consists of two years of training, of which the first is national service and the second in a teachers' college. The original fixed-wage basis and inferior status were later found to be wrong both in equity and in fact.

TABLE 12. Tanzania second five-year plan: cost per place of secondary school expansion

	New school, Form I-IV	Adding to existing schools	
		Form I-IV	Form V-VI
Planned cost per place	£661-779	£444-697	£1 125-1 383

SOURCE *Second five-year plan*, Vol. II, op cit.

Detailed discussion of higher education has been outside the scope of this paper, as the financing of the university college of Dar-es-Salaam was not within the direct control of the Tanzanian government. A description of the planning process and the financial structure of the University of East Africa is given in another case study in this series.¹

However, during the first five-year plan period the Tanzanian government did not try to exert very much control over the university college. The fall in the recurrent cost per student that took place was due partly to the rapidly expanding student numbers, from a very low base, and partly to the imposition by the University Grants Committee of strict staffing norms. Similarly, on the capital side there was little attempt at economizing.

It was planned that the university college of Dar-es-Salaam would become the University of Tanzania in 1970, and the Tanzanian government was therefore anxious that unit costs should not rise, in spite of the addition of expensive professional faculties. The average capital cost per place in 1969 was £5,000 and it is planned that new places will cost £2,000. The Tanzanian government is aware of the danger of rising university unit costs; there was a space utilization survey in 1969, and this has had an important influence on capital development plans.

IV. Conclusions

In the first Tanzanian five-year educational plan secondary and higher education were tied to manpower requirements and the emphasis in primary education was on structural and qualitative improvements. Although the enrolment targets set were largely implemented, the costing exercise had its weaknesses. Capital costs in particular bore little relationship to actual expenditure. Four basic lessons may be learnt from the Tanzanian experience.

1. If accurate projections of recurrent costs are to be made, projections of the experience and qualification structure of the teaching force must first be made. When changes, other than marginal ones, are being planned the average cost

1. See Bennett, op. cit.

per teacher at any given level is likely to change considerably. The magnitude and direction of this change can only be properly calculated if the composition of the teaching force is first analysed.

2. Meaningful projections of capital costs cannot be made on an over-all basis. Building costs vary from district to district, and the facilities already available differ. The only way accurate over-all projections of capital costs can be made is to design and cost the individual projects that make up the programme.
3. Before any capital expenditure is undertaken at a given level, the use made of existing facilities at that level should be studied. Only when the existing facilities are being fully used should new capital expenditure be undertaken. New buildings should be constructed in accordance with fixed space and utilization criteria.
4. Too great a reliance should not be placed on foreign aid.

Most of the above points were taken into consideration in the preparation of the second five-year plan, and in most respects, the costing exercise is likely to prove more accurate. Nevertheless, greater use could have been made of cost-benefit evaluation and cost-effectiveness studies in the second planning process, and more emphasis placed on the use made of existing buildings, particularly in the case of teacher-training colleges.

Though the expansion of secondary and higher education in the second plan was still based on manpower criteria, the order of priorities was changed. Primary, rather than secondary and higher education, was to be given top priority. Such a change entails a change in the techniques used by the educational planner. No longer does he know by how much the system must expand, he has to work out by how much the country can afford to expand the system. The more unit costs can be reduced, particularly recurrent costs, the more the system will be able to expand. Accurate costing becomes much more important than in a situation where the planner is told that the system must expand by a given amount to meet manpower requirements, whatever the cost.

Tanzania

2

Factors influencing change in teachers' basic salaries

prepared by John Chesswas

In preparing this study. Mr. John Chesswas, an IIEP staff member, was assisted by Miss Höök (Sweden) a staff member of the Unesco Regional Office for Education in Latin America, and Mr. Mayagila (Tanzania) and Mr. Chetcuti (Malta) who were Interns of the Institute. Mr. Coombs and Mr. Hallak served as principal advisers to the study. The author and the Institute gratefully acknowledge the helpful co-operation given by officials of the Ministry of education of Tanzania in providing the basic data for the study.

Introduction

Cost analysis is fundamental to educational planning. It is therefore important that costing should be as accurate as possible. The main objective of this study is to provide a reliable methodology for projecting teachers' salaries, the largest element in educational expenditure. In the main the evolution of teachers' salaries is influenced by economic factors such as changes in the general level of wages and prices, as well as by endogenous educational variables which include planned changes in the over-all enrolment ratio, methods of staffing classes, methods of supplying teachers, etc. While both factors are fundamental to the computation of teachers' salaries, this paper confines itself to the operative factors within the educational system in order to isolate their influences on teachers' salaries and also to emphasize to planners how such factors could be handled in projecting the total teachers' salaries bill.¹

Purpose of the study

This study is concerned with a quite common situation, in which a corps of teachers employed in a sector of an educational system is made up of groups belonging to different categories with different qualifications, each category being paid on a different incremental salary scale. The purpose of the study is to show how the total of the basic salaries of such a corps of teachers is influenced by the compounding of two factors:

- (a) changes over the years in the numbers and proportions of the teachers belonging to each category; and
- (b) the changing proportions within each category at each point of the scale, particularly as influenced by the age structure of the teaching force.

It is further demonstrated how these two factors are themselves influenced by a combination of three others:

- (a) the development of the numbers of classes at each grade in the educational sector concerned; allied with
- (b) the method of staffing classes at the various grades with teachers of the different categories; and
- (c) the methods and rate of supply of trained teachers, in particular pre-service training versus the upgrading of serving teachers as a means of supplying teachers of higher qualifications.

These factors need to be taken into consideration when making policy decisions, and the study illustrates the dangers of basing decisions on inadequately costed projections.

The development of primary education in mainland Tanzania is used to illustrate this study. The year of the latest available statistical data, 1967, is used as the base,

1. For readers who may be interested, appendix III shows the relation of average teacher's salary (primary schools) to per capita GDP, both at constant prices.

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and 1979 is chosen as the target year, being ten years, i.e. two five-year development periods beyond the end of the 1964-69 development period.

The study is divided into the following major sections: I. The educational system and relevant policies: II. Illustrative model of development of primary education: III. Study of teachers' basic salaries resulting from model development of primary education: IV. Conclusions and policy implications. The methodology used is described in an appendix.

Statistical data

The statistical data used in this study are taken from sources shown in the footnotes and supplemented by certain items which officials of the Tanzanian Ministry of education were kind enough to make available.

I. The educational system and relevant policies

A. The educational system

At independence the public educational system consisted of an eight-grade primary system, namely standards I to VIII. Secondary education which follows is in two stages, the first stage comprising four grades and the second two grades. These are called forms I to VI. Secondary education leads to a three-year first degree course at the University of East Africa (UEA). The Tanzanian university college, which is one of the three making up the UEA, is located at Dar-es-Salaam and was set up during the early years of independence. The school year is from January to December.

Over the three years 1965-67 the primary course was shortened to seven grades (standards I to VII) progressively in three zones of the country.

B. Teachers

Before independence there were two grades of primary teacher: grade I teachers—two years' training after either the second grade of secondary school or on completion of the fourth (10 + 2 or 12 + 2); grade II teachers—two years' training after the completion of primary education (8 + 2). From 1961 these were divided into three categories: grade A, 12 + 2; grade B, 10 + 2; and Grade C, 8 + 2. All the previously trained teachers were re-designated, grade I as either grade A or B, and grade II as grade C. Pre-service training of grade B teachers ceased with the output at the end of 1964, but there was an increase in the numbers of grade C teachers upgraded to B, a process which had been started a year or so earlier.

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This included the conversion of some women grade C teachers to grade B home economics specialists for primary schools. At the second level of education, in addition to university graduate teachers, there is a lower grade of trained teachers who are given two years' training after full secondary education (old 14 + 2, new 13 + 2), and named Education Officers, grade III (E.O.III).

The upgrading of teachers is an important feature of the Tanzanian educational system. The majority of upgrading takes place from C to B, and the normal route is via an in-service course. Originally this course consisted of a first year's correspondence course followed, for those successful, by vacation courses at teacher-training colleges. In 1966 this was changed to three periods of four to six weeks each in colleges, the first in November/December of one year and the second and third in August and November/December of the following year.¹

The principles underlying the selection of candidates for upgrading courses are (i) that selection takes place in the year before the course starts, (ii) that no teacher still serving his two-year probationary period after leaving pre-service training is eligible, (iii) nor can any teacher who has completed five years or more of service be considered. This means, in effect, that in any one year those selected for entry to the following year's course are confined to the teachers in their third, fourth or fifth year of service after pre-service training, and that they are upgraded at the end of their fifth, sixth or seventh year of service respectively.

At the end of 1966 and 1967 there were two groups of teachers who were awarded 'merit upgrading' with no further training. This included teachers in grades A, B and C, and was confined to a selection from teachers with several years of service which seems to indicate that it was intended to give opportunities to those who missed the net of the normal upgrading route.

C. Teachers' salaries

The scale of salaries for each category of teacher is a segment of a long scale, as is shown in appendix I. It should be noted that the scales overlap. When a teacher enters service at the beginning of the year after qualifying from pre-service training he enters the appropriate scale at the bottom point and stays there for the two years of his probation.² Once confirmed in his appointment he then proceeds up the scale by annual incremental steps at the beginning of each year until he reaches

1. United Republic of Tanzania, *Annual report of the ministry of education, 1966*, Dar-es-Salaam, Government Printer, 1967 (page 31).

2. It has now been learnt that government policy in this regard has changed. A new teacher now receives annual increments from the outset. Although such increments could be terminated at the end of the two-year probationary period if the teacher's performance were found to be unsatisfactory, such cases are rare.

There is no need to reflect this change in policy in the methodology of this study, since the main aim is to demonstrate how the choice of important and relevant policies at a particular time could affect the quantitative results of a programme. The principles of the methodologies remain the same as long as there is an incremental scale.

the maximum point, where he stays until he leaves the service or is upgraded. There are, of course, teachers who do not proceed so regularly, who have increments stopped or withheld or who have a break in service, which ultimately puts them on points below those of their fellows with whom they qualified; however, it is probably true to say that most of the teaching force who stay in service are on their 'correct' points.

When a teacher is upgraded he gets no immediate financial advantage, unless the minimum point of his new grade is higher than the point on which he would have been if he had not been upgraded. This means that a grade C teacher who is upgraded can look forward to enjoying the benefits of the segment of the scale above £444, but the grade B teacher who had already reached the point £330 gains nothing at all on being converted to A.¹

D. Relevant policies

During the 1964-69 development plan the main emphasis in the development of educational services was on the secondary and higher levels for the provision of urgently needed middle- and high-level manpower to lead the country's development. Thus, in view of the scarcity of resources, progress in primary education had to be restricted so that entry to standard I compared with the estimated school age population gives a constant 'participation rate'.² It did not, however, prevent local authorities, who are responsible for the administration of primary education, aiding further development by the use of their own resources once they had fulfilled the central government's plans, and some of the richer authorities took advantage of this opportunity. This resulted in national enrolments in standard I in public schools rising at a slightly higher rate than child population, as is shown in table 1. However, the apparent non-schooling gap continued to rise (in absolute numbers).

Another aspect of primary education which causes the ministry serious concern is the fact that many schools in rural areas do not go beyond standard IV, which results in a distribution of classes by grade as shown in table 2. This table also illustrates the problem of half-time teaching in some schools at standards III and IV, and the progress that is being made towards the ministry's objective of abolishing it altogether.³

Now that secondary education is more closely related to manpower needs, there will be the opportunity to shift the emphasis of development to the primary school sector. Assuming that the comparatively small residue of half-time teaching will soon have been cleared, the raising of the entry rate and the relative expansion

1. Perhaps this is one of the reasons why there is little upgrading from B to A!

2. G. Skorov, 'Integration of educational and economic planning in Tanzania' in *Educational development in Africa*, volume III, Paris, Unesco: IIEP, 1969.

3. In the budget speech of June 1968 the Minister of education stated that 'there are now less than three hundred public primary schools which still have half-day attendance at this level': See Budget speech, Minister of education, June 1968 (unpublished).

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TABLE 1. Relationship between enrolment standard I public schools¹ and estimated population aged 6, 1960 to 1967, Tanzania mainland

Year	Enrolment standard I public schools	Estimated population ² aged 6	Relationship enrolment standard I/ population 6	Apparent non-schooling gap
1960	116 547	271 100	0.430	154 600
1961	121 386	279 200	0.435	157 800
1962	125 521	287 600	0.436	162 100
1963	136 496	296 200	0.461	159 700
1964	140 341	305 100	0.460	164 800
1965	149 314	314 300	0.475	165 000
1966	154 512	323 700	0.477	169 200
1967	157 196	333 400	0.471	176 200

1. The Tanzanian definition of a 'public school' is one that is maintained or aided by a public authority.
2. A simple calculation based on information in United Republic of Tanzania, *Recorded population changes 1948-67*. Dar-es-Salaam, Government Printer, 1968, gives a 3 % annual increase in total population. There is no evidence available at present on the variations in rate of growth of population in the different age groups. It is therefore assumed that the rate of growth of the six-year-old group is the same as that of the total population. Using the figure calculated by the planning division of the Ministry of education for 1967, those for previous years have been calculated on the same basis.

of the facilities at standards V to VII are two obvious major points on which the ministry must concentrate attention. They are therefore taken as the basis for the construction of the model of development in the following section of this study.

During the 1964-69 development plan the policy with regard to teachers was to aim at increasing the proportion of grade A teachers and reducing that of grade C in the teaching force. Accordingly the numbers of students in grade A pre-service training have been increasing annually and those of grade C decreasing. It was originally intended that by 1968 there should be no further admission of grade C students,¹ but in his 1968 budget speech the Minister of education announced a change in this policy arising from financial considerations.² He stated that the aim was to staff each full primary school with at least three grade A and five grade B or C teachers. This makes a minimum of eight teachers for seven grades and implies a supernumerary teacher, presumably either a headmaster or headmistress or a home economics teacher, in accordance with past practices. He also stated that active consideration was being given to a special three-year course of training for women who have completed a full primary education to equip them to become teachers of the lower classes. In this study it is assumed that this would be a new type of grade C teacher.

1. *Annual report of the ministry of education, 1966*, op. cit., p. 31.

2. Budget speech, op. cit.

II. Illustrative model of development of primary education

Table 2 shows that unaided primary schools account for less than 10 per cent of the total number of classes. As expansion of the public system is often achieved by drawing existing unaided schools into the aided system, it can be envisaged that ultimately compulsory primary education will be paid for by public authorities. In these circumstances this study is confined to public primary schools.

A. Analysis of recent trends

1. *Enrolment standard I*

No statistics are available on entrants, repeating and drop-out rates. Under these circumstances, an enrolment ratio for the single grade, being the relationship between the enrolment in standard I and the estimated population aged 6, (the official age of entry), is used to indicate the proportion of children entering school.¹ Recent trends are summarized in table 1 and illustrated in figure 1. As has already been noted, the apparent enrolment ratio has been rising slowly while the absolute numbers of children not enrolled has also been rising.

2. *Classes*

Table 2 shows the recent growth in numbers of classes at each grade. The situation is complicated by the half-time/full-time situation in standards III and IV, the progressive elimination of standard VIII, and the fact that standard II does not have its own teacher but is taught in the afternoons by the same teacher who teaches standard I in the mornings. The comparison of the full-time equivalent classes needing teachers with the teachers available shows that there have always been a few more teachers than full-time equivalent classes, but only once, in 1966, has the margin in public schools risen above 10 per cent.

Although the ministry's development plan adds seventy classes to standard I each year, those financed by some local authorities from their own resources (as mentioned above) have increased the numbers still further. The annual percentage increase in total classes at standard I was as follows:

1. This is different from the usual use of the enrolment ratio, which normally indicates the relationship between the enrolment in the total sector (in this case primary education) and the estimated population of the age group associated with that sector. Like the normal enrolment ratio, that used in this study is only 'apparent', as the enrolment includes children who do not belong to the age to which it is being compared. Similarly the non-schooling gap, being the difference between the estimated population and the enrolment, is also apparent. It is nevertheless to be hoped that with an increasing proportion of the enrolment being of the official age, and with repeating rates falling, differences between normal and apparent enrolment ratios would eventually disappear.

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TABLE 2. Number of classes by grade compared with teachers available, 1963-67

Year	Kind of school	Number of classes by grade										Full-time equiv. total	Number of teachers	Ratio of number of teachers to full-time equivalent teachers all classes			
		III			IV		V		VI		VII				VIII		
		I ¹	II ²	Half-time	Full-time	Total	Half-time	Full-time	Total	Full-time	Full-time				Total	Full-time	Full-time
1963	public	3 227	3 161	1 156	1 905	3 061	1 135	1 905	3 040	933	755	516	467	15 160	10 853	11 100 ²	1.023:1
1964	public	3 231	3 182	1 460	1 647	3 107	1 385	1 794	3 179	1 115	1 035	698	548	16 095	11 490	12 044	1.048:1
1965	public	3 362	3 298	1 261	1 986	3 247	1 184	1 932	3 116	1 252	1 159	832	687	16 953	12 452	13 576	1.092:1
	unaided ³	610	577	109	56	165	95	37	132	82	80	35	31	1 712	1 033	1 140	1.104:2
1966	public	3 474	3 412	971	2 339	3 310	965	2 295	3 260	1 430	1 288	1 205	417	17 796	13 416	14 809	1.104:1
	unaided	717	615	80	61	141	68	41	109	49	44	37	17	1 729	1 040	1 053	1.012:1
1967	public	3 627	3 555	916	2 607	3 523	887	2 508	3 395	1 487	1 409	1 229	206	18 431	13 974	15 271	1.093:1
	unaided	818	758	116	52	168	107	45	152	58	63	52	10	2 079	1 209	1 243	1.029:1

1. There are no separate teachers of standard II. The same teacher teaches standard I in the morning and standard II in the afternoons, and each of these sessions is considered 'full-time' for these low grades.

2. Estimate.

3. Statistics for unaided schools available only from 1965 onwards.

United Republic of Tanzania. *Annual report of the ministry of education, 1963-67*. Dar-es-Salaam, Government Printer, various years.

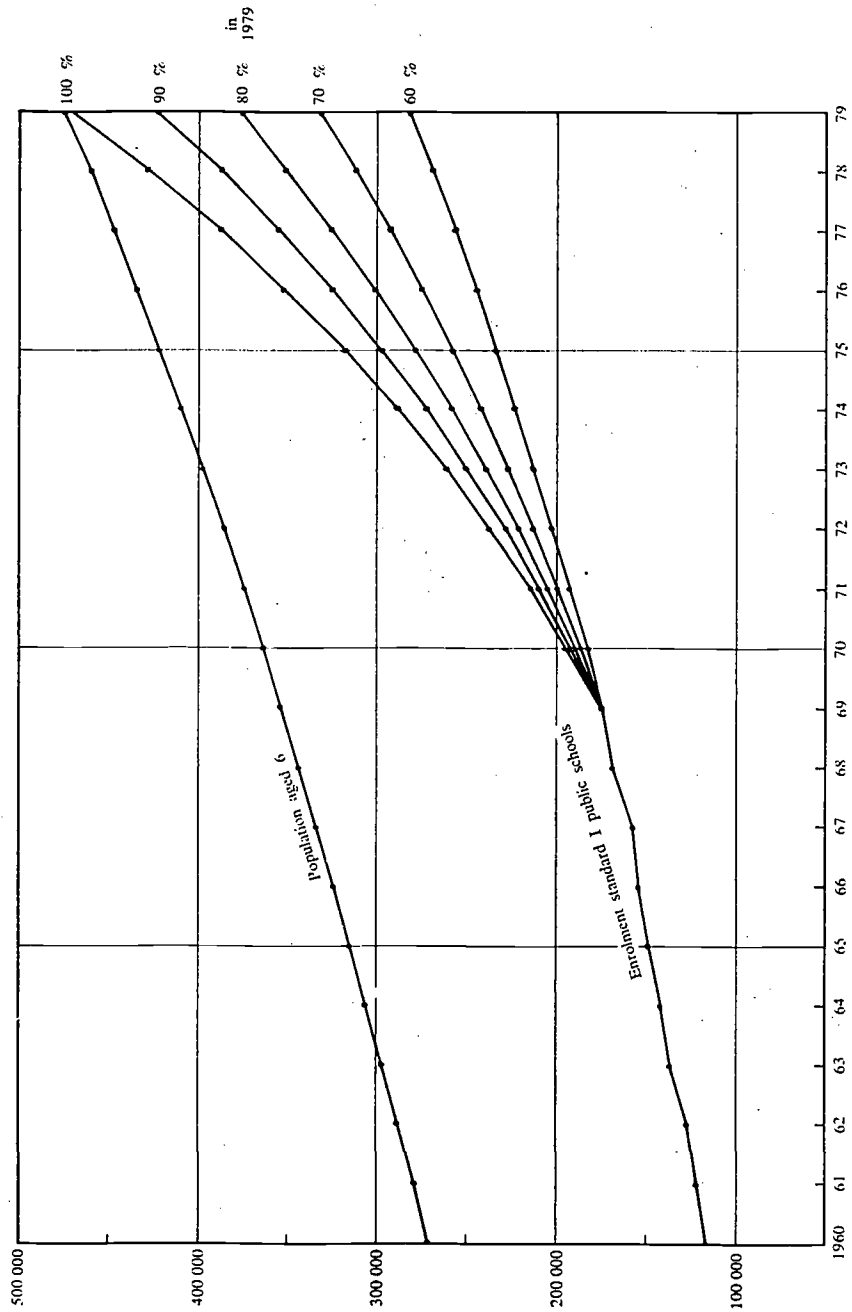


FIGURE 1. Trends in relationships between enrolment in standard I in public schools and population aged 6, assuming alternative targets for 1979.

1964/65	4.1 per cent
1965/66	3.3 per cent
1966/67	4.4 per cent
Average	3.9 per cent

It is assumed that this average will apply to 1968 and 1969. This means that the projected number of classes at standard I in public schools, (3,768 in 1968 and 3,915 in 1969), at the official forty-five pupils per class, gives a potential enrolment of 169,560 in 1968 and 176,175 in 1969, as is shown in figure 1. This provides for an apparent initial enrolment ratio of 49.8 per cent and an apparent non-schooling gap of 177,500 in 1969, on the basis of a population aged 6 increasing from the 1967 figure to $333,400 \times (1.03)^2$, or 353,700.

The other factor which has been observed to be of importance in the quantitative development of primary educational facilities is the promotion opportunity from standard IV to standard V. From table 2 the recent trends in public schools have been as follows:

$$\frac{\text{number of classes standard V 1964}}{\text{number of classes standard IV 1963}} = 0.367$$

$$\frac{\text{number of classes standard V 1965}}{\text{number of classes standard IV 1964}} = 0.394$$

$$\frac{\text{number of classes standard V 1966}}{\text{number of classes standard IV 1965}} = 0.459$$

$$\frac{\text{number of classes standard V 1967}}{\text{number of classes standard IV 1966}} = 0.456$$

It is assumed that the approximately 46 per cent shown in the last two relationships will apply to the 1968/67 and 1969/68 relationships.

3. Teachers

Table 3 shows recent trends in the structure of the teaching force in public primary schools by category, and reflects the policy outlined above, namely the proportion of grade A teachers rising slowly and that of grade C dropping. The absence of untrained teachers should be noted, an unusual phenomenon in an African country. The force consists almost entirely of teachers of grades A, B and C.

In the light of the ministers' latest statement about staffing policy, table 4 indicates an interesting trend. Assuming that the better educated grade A teachers are employed in the upper grades of the primary schools, the relationship between the numbers of such teachers and the numbers of classes at the upper grades is important. It is clear from table 4 that there are as yet hardly enough to staff classes at standard VII, and there is a long way to go before the target of three grade A teachers per full primary school can be achieved.

TABLE 3. Structure of the teaching force by category in public primary schools, 1963-67

Year	A		B		C		Other trained		Untrained		Total	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
1963 ¹	500	4.5	1 300	11.7	9 300	83.8	—	—	—	—	11 100	100.0
1964	537	4.5	1 379	11.4	9 704	80.6	424	3.5	—	—	12 044	100.0
1965	812	6.0	1 556	11.5	10 830	79.8	301	2.2	77	0.6	13 576	100.0 ²
1966	1 205	8.1	1 676	11.3	11 500	77.7	428	2.9	—	—	14 809	100.0
1967	1 338	8.8	1 624	10.6	11 950	78.3	359	2.4	—	—	15 271	100.0 ²

1. Estimates.

2. Totals differ due to rounding.

SOURCE Annual report of the ministry of education, various years, op. cit.

Another factor which must be taken into account is the employment in other educational sectors of teachers trained for primary schools, due to shortages of more highly qualified teachers. It is assumed that plans will be made to rectify the latter shortage, and in projecting public primary education into the future it is therefore important to consider all teachers of each category in service in the base year, wherever they are teaching, on the assumption that eventually they will return to where they rightly belong —the primary schools. The full base from which projections of teachers start is therefore as follows:

	Male	Female	Total
Grade A	1,106	454	1,560
Grade B	1,416	285	1,701
Grade C	9,414	2,760	12,174

TABLE 4. Relationship between stock of grade A teachers and numbers of classes at upper grades, public primary schools, 1963-67

Year	No. of grade A teachers	No. of classes		Relationship teachers/classes VII/VIII (percentage)
		VII	VIII	
1963	500 ¹	516	467	51
1964	537	698	548	43
1965	812	832	687	53
1966	1 205	1 205	417	74
1967	1 338	1 229	206	93

1. Estimate.

SOURCE *Annual reports of the Ministry of education*, op. cit.

B. Projections

1. Enrolment standard I

The target enrolment ratio for 1979 cannot be less than the 50 per cent of 1969, and it will almost inevitably have to be more. Table 5 and figure 1 show projections of increases in enrolments in standard I in public schools between 1969 and 1979. Alternative apparent enrolment ratios at intervals of 10 per cent from 60 to 100, and the estimated population aged six, are shown.

From these alternatives the target of 80 per cent has been chosen for the following example. It is an arbitrary choice, made simply for the purpose of illustrating the methodology used. The methodology can be applied no matter which target is chosen.¹

1. These considerations are academic. They do not imply any policy decision or intention on the part of the Tanzanian government. The figure of 80 per cent is used because it happens to be the middle choice. Similarly, the choice of the figure for promotion opportunities in the next paragraph is purely arbitrary.

TABLE 5. Projections of annual enrolments (in thousands) in standard I based on alternative enrolment ratios

Year	Population	Apparent enrolment ratio 1979				
		60 %	70 %	80 %	90 %	100 %
1970	364.3	184.8	187.8	190.3	192.4	194.5
1971	375.2	193.9	200.2	205.5	210.1	214.7
1972	386.5	203.4	213.4	221.9	229.4	237.1
1973	398.1	213.3	227.5	239.7	250.5	261.7
1974	410.0	223.8	242.5	258.9	273.6	288.9
1975	422.3	234.7	258.5	279.6	298.7	319.0
1976	435.0	246.2	275.6	301.9	326.2	352.2
1977	448.1	258.3	293.8	326.1	356.2	388.8
1978	461.5	271.0	313.2	352.2	389.0	429.2
1979	475.3 ¹	284.2	333.8	380.3	425.9	473.8
Annual percentage rate of increase in enrolment standard I		4.9	6.6	8.0	9.2	10.4

1. Slightly different due to rounding off.

2. Promotion standard IV to standard V

It is also clear that it would be unreasonable to plan for a rate below the 46 per cent of the last few years in the relationship between the number of classes at standard V in one year and those at standard IV in the previous year. There are numerous ways of tackling this problem, ranging from maintaining the 46 per cent to increasing enrolments to 100 per cent—even an immediate jump to the latter figure can be envisaged. The following progression is chosen to illustrate a gradual approach to expansion.

Standard	Percentage	Standard	Percentage
V 1969/IV 1968	46.0	V 1974/IV 1973	53.5
V 1970/IV 1969	47.5	V 1975/IV 1974	55.0
V 1971/IV 1970	49.0	V 1976/IV 1975	56.5
V 1972/IV 1971	50.5	V 1977/IV 1976	58.0
V 1973/IV 1972	52.0	V 1978/IV 1977	59.0
		V 1979/IV 1978	60.0

An examination of a time-series of enrolments in primary schools shows apparent retention rates from standard I to IV and from standard V to VII which are unusually high for an African country. There is no indication as to whether this is due to promotion or high rates of repeating. However, it can be assumed that the number of classes formed at standard I generates the same number at standard II in the following year and so on up to standard IV. Likewise with standards V to VII.

Using the two choices made in the foregoing paragraphs, therefore, the numbers of classes at each grade can be projected annually for 1970 to 1979. Figures for

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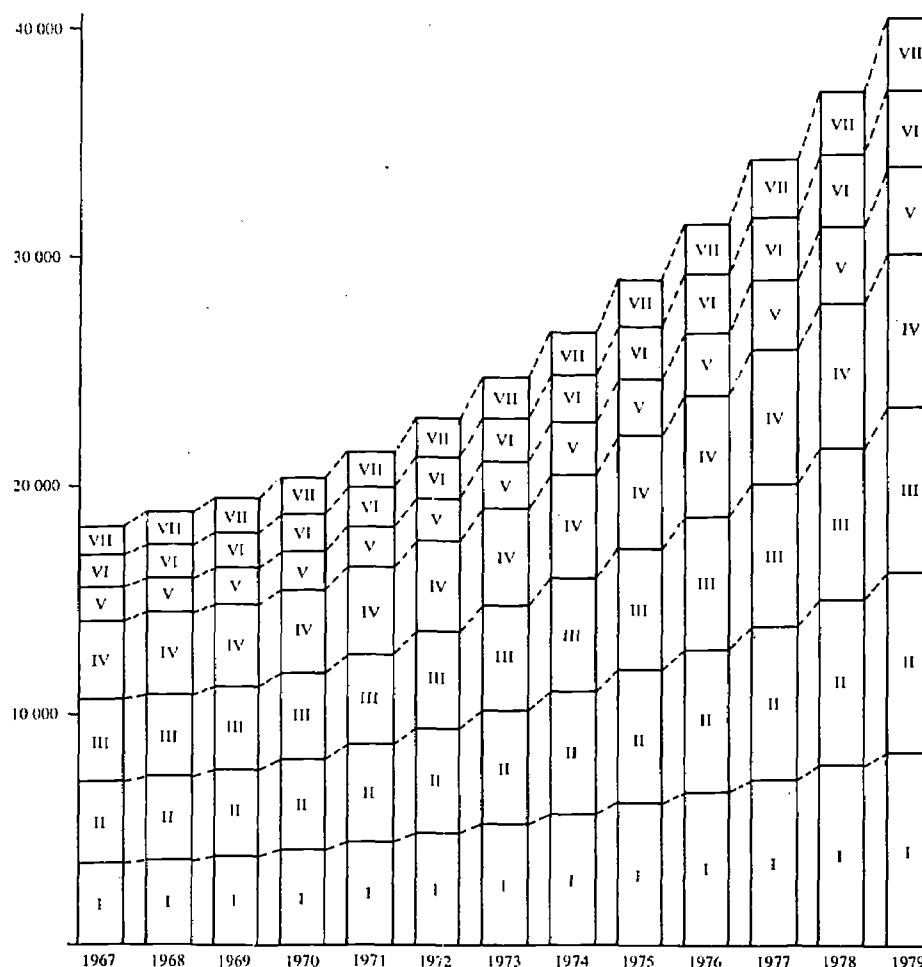


FIGURE 2. *Development of classes by grade to achieve 80% relationship between enrolment standard I and estimated population aged 6; and progressively to raise the relationship between the number of classes at Standard V and those at Standard IV in the previous year from 46% in 1967, 1968 and 1969 to 60% ; both targets for 1979.*

the base year 1967 and the two remaining years of the current development plan are also included. The result is shown in table 6 and figure 2. When the classes are totalled, their annual percentage increase is as follows:

Percentage	Percentage	Percentage
1967/68 2.7	1971/72 6.7	1975/76 8.7
1968/69 3.2	1972/73 7.6	1976/77 8.7
1969/70 4.5	1973/74 8.1	1977/78 8.6
1970/71 5.7	1974/75 8.4	1978/79 8.6

Obviously the full effect of the higher rate of increase of classes at standard I is not felt until the first increase in 1970 reaches standard VII in 1976—a strong argument for planning for at least the number of years ahead that there are grades.

3. Teachers

The full details of the increased numbers of teachers needed to staff the projected development in 1979 are given in appendix II. For the moment the only points that need to be mentioned are as follows:

1. The formula for staffing given in the minister's speech refers to a 'full primary school'. This is taken to mean a school which has classes at all grades from standard I to VII. His statement implies a supernumerary teacher for such a school, and it is assumed that it also implies that a school which had not reached 'full' primary status will continue the present practice of one teacher per class. However, some of the full primary schools are likely to have more than one stream, especially urban schools, and this might modify the formula. Table 6 shows 3,090 classes at standard VII in 1979, 7.6 per cent of the total number of classes. Since some of these classes will be in multi-stream schools, it has been arbitrarily assumed that the total number of full primary schools will be equivalent to only 5 per cent of the total number of classes, i.e., 2,022. The 2,022 supernumerary teachers this would require have, also arbitrarily,

TABLE 6. Projection of number of classes by grade¹

Year	I	II	III	IV	Total I-IV	V	VI	VII	Total I-VII
1967	3 627	3 555	3 523	3 395	14 100	1 487	1 409	1 229	(18 431) ²
1968	3 768	3 627	3 555	3 523	14 473	1 562	1 487	1 409	18 225
Percentage	(19.9)	(19.2)	(18.8)	(18.6)		(8.3)	(7.9)	(7.4)	(100.0) ³
1969	3 915	3 768	3 627	3 555	14 865	1 621	1 562	1 487	19 535
1970	4 228	3 915	3 768	3 627	15 538	1 689	1 621	1 562	20 410
1971	4 566	4 228	3 915	3 768	16 477	1 777	1 689	1 621	21 564
1972	4 932	4 566	4 228	3 915	17 641	1 903	1 777	1 689	23 010
1973	5 327	4 932	4 566	4 228	19 053	2 036	1 903	1 777	24 769
1974	5 753	5 327	4 932	4 566	20 578	2 262	2 036	1 903	26 779
1975	6 213	5 753	5 327	4 932	22 225	2 511	2 262	2 036	29 034
1976	6 710	6 213	5 753	5 327	24 003	2 787	2 511	2 262	31 563
1977	7 247	6 710	6 213	5 753	25 923	3 090	2 787	2 511	34 311
1978	7 827	7 247	6 710	6 213	27 997	3 394	3 090	2 787	37 268
1979	8 452	7 827	7 247	6 710	30 236	3 728	3 394	3 090	40 448
Percentage	(20.9)	(19.4)	(17.9)	(16.6)		(9.2)	(8.4)	(7.6)	(100.0)

1. Projection is based on a target of 80 per cent enrolment ratio in standard I to population aged 6 in 1979 and 60 per cent relationship between classes at standard V in 1979 and those at standard IV in 1978.

2. Including standard VIII.

3. Totals differ due to rounding off.

been divided equally between grade A heads of schools and grade B women home economics specialists.

2. The Minister announced an intake into grade A colleges of about 1,100 in 1968. It has been assumed that this figure will remain constant throughout the next two five-year plans, and the outputs of grade A teachers have been projected on this basis. In 1979 this would allow for the supernumerary heads mentioned in the previous paragraph plus a grade A teacher for every class at standards V to VII and a few for standard IV, which would meet the minister's policy of 'at least three grade A teachers' for each full primary school and a margin above it. It has then been assumed that teachers of the remainder of the classes at standard IV and the home economics teachers will be grade B, produced by upgrading grade C teachers. Standards I to III are to be staffed by grade C teachers, including some of the new type of women infant teachers, with the practice of staffing standards I and II with the same teacher being continued.¹

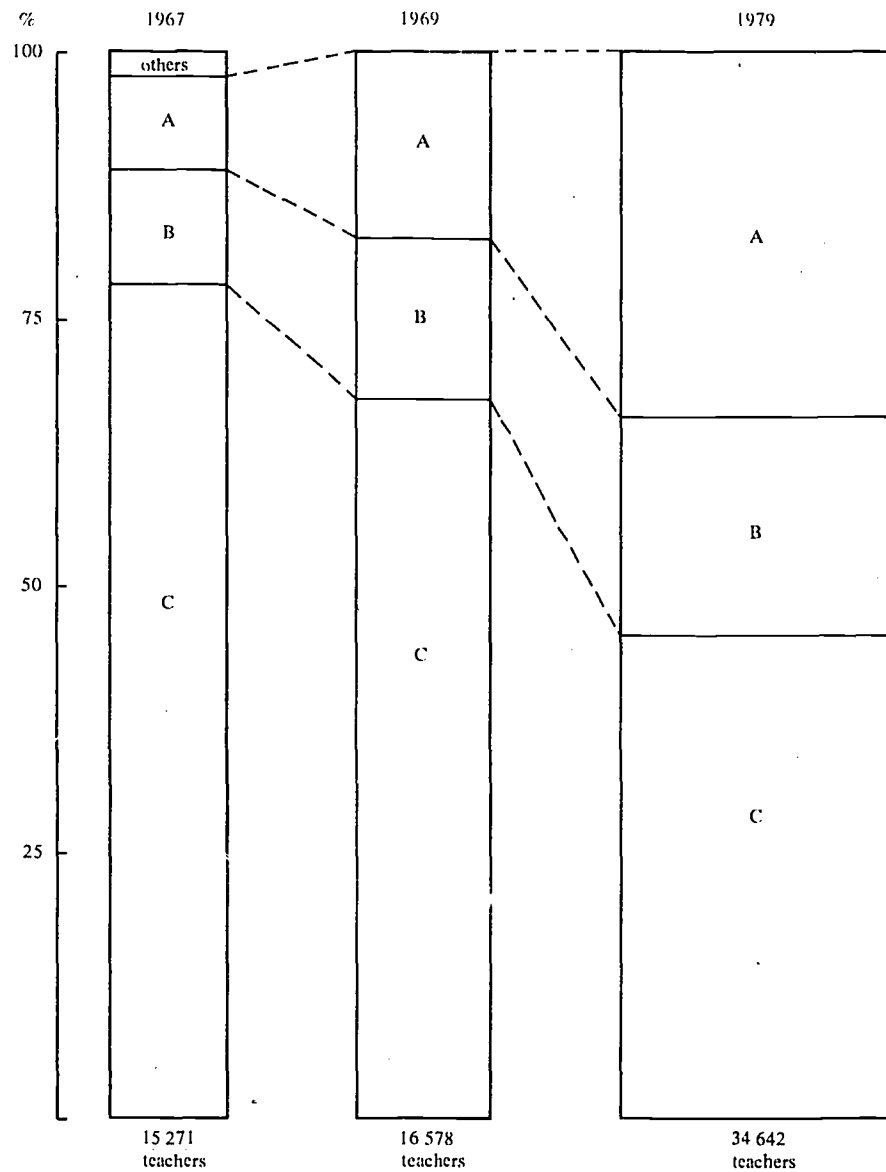
III. Study of teachers' basic salaries resulting from model development of primary education

The results of the projections for numbers of teachers are summarized in tables 7 to 10 and illustrated in figures 3 and 4. Table 7 and figure 3 show how the proportions of teachers of the different categories change as the policies relating to the production of teachers are implemented. It is important to remember that the change which took place during the comparatively short period between 1967 and 1969 is the natural result of the situation and policies as they were in 1967, because all the teachers represented by the 1969 figures were either in service or training in 1967. The change during those two years is quite significant; it is, of course, mainly the result of the previous decision to run down grade C training and expand grade A training, combined with the policy of merit upgrading for older teachers. Changes occurring in certain important factors can be indexed as shown in table 11 (page 60).

The last item is, of course, the result of the compounding of the increase in the total number of teachers and that of the average salary of all teachers. The average salary of all teachers is arrived at by compounding the redistribution of the proportions of teachers of each category in the total force and the change in the average salary of each category. The latter is the result of (i) the proportionate

1. See footnote 1 to table 2.

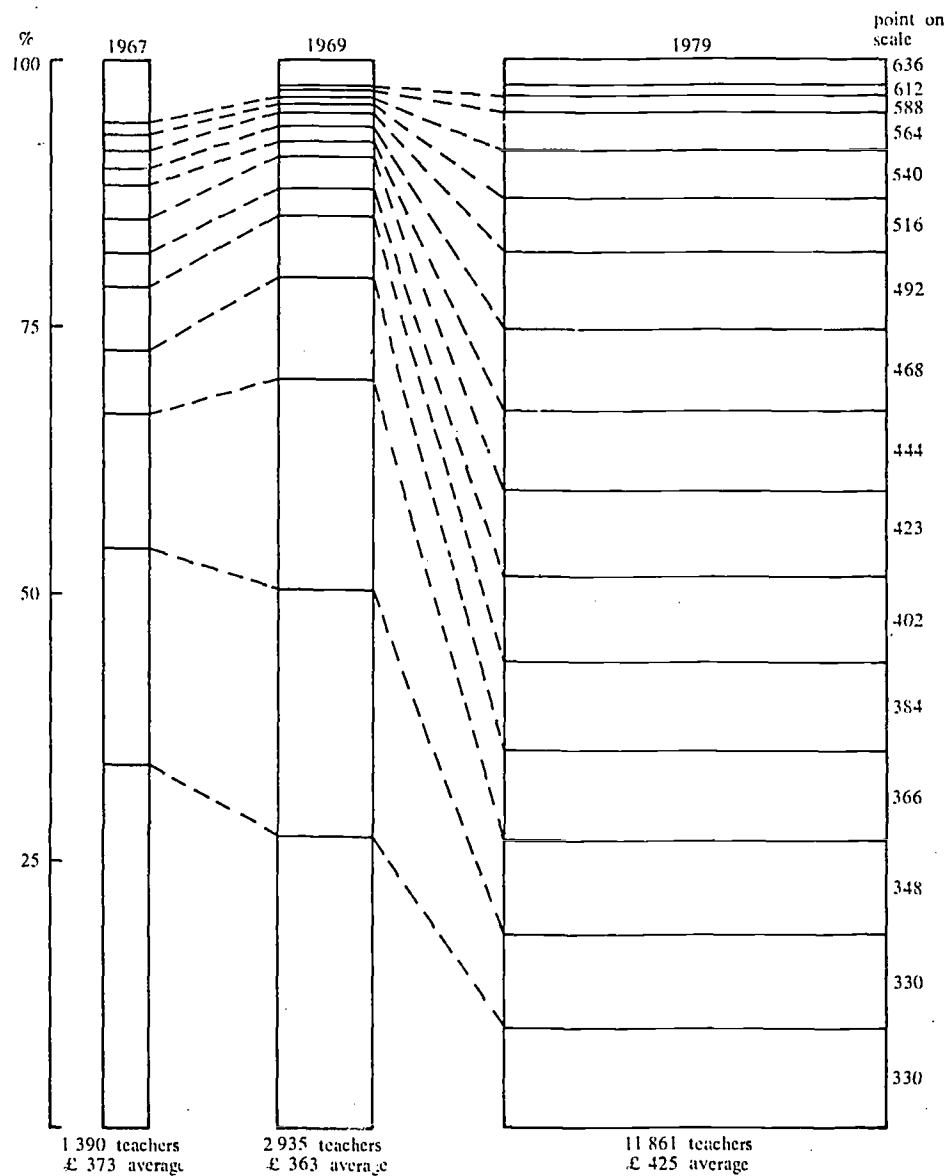
Educational cost analysis in action: case studies for planners



NOTE The width of each histogram is proportionate to the total number of teachers shown at the bottom. The height of each section for each category of teachers is proportionate to its percentage of the total stock. The area of each category for each year therefore represents the total number of teachers of the category.

FIGURE 3. *Distribution of teaching staff in public schools by category, 1967, 1969 and 1979.*

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NOTE These histograms are constructed from the numbers and proportions of teachers who can be allocated to specific point on the grade A salary scale, as is shown in the totals at the bottom of table 8. The width of each histogram is proportionate to the total number of teachers shown at the bottom of the diagram. The height of each section for each point on the scale is proportionate to the percentage of the total on that point, taken from table 8. The area for each section of each histogram therefore represents the total number of teachers on each point in each year.

FIGURE 4. Distribution of stock of grade A teachers by point on the salary scale, 1967, 1969 and 1979.

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1. Projections were based on 1967 actual data.
2. Totals differ due to rounding off.

Year of graduation original group	1967			1969			1979					
	Numbers in service	Point on scale		Numbers in service	Point on scale		Numbers in service	Point on scale				
		Percentage	£ p.a.		Percentage	£ p.a.		Percentage	£ p.a.			
1954	81	5.8 av.	610	49 410	74	2.5 av.	628	46 472	69	2.6	636	43 884
and prior												
1967												
m.u.u. ¹												
1955	15	1.1	540	8 100	17	(—) av.	524	8 908	9		636	5 724
1956	21	1.5	516	10 836	13	0.4	588	7 644	13		636	8 268
1957	22	1.6	492	10 824	19	0.6	564	10 716	14		636	8 904
1958	24	1.7	468	11 232	20	0.7	540	10 800	15		636	9 540
1959	43	3.1	444	19 092	22	0.7	516	11 352	15		636	17 172
					39	1.3	492	19 188	27		636	

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1960	45	3.2	423	19 035	41	1.4	468	19 188	29	636	18 444
1961	44	3.2	402	17 688	43	1.5	444	19 092	30	636	19 080
1962	84	6.0	384	32 256	81	2.8	423	34 263	54	636	34 344
1963	81	5.8	366	29 646	79	2.7	402	31 758	51	636	32 436
1964	175	12.6	348	60 900	171	5.8	384	65 664	111	612	67 932
1965	279	20.1	330	92 070	278	9.5	366	101 748	194	588	114 072
1966	476	34.2	330	157 080	577	19.7	348	200 796	431	564	243 084
Unknown ²	170	(—)	av. 346	58 824	153	(—)	av. 384	58 752	—	—	—
1967					680	23.2	330	224 400	513	540	277 020
1968					798	27.2	330	263 340	613	516	316 308
1969									860	492	432 120
1970									884	7.5	468
1971									906	7.6	444
1972									934	7.9	423
1973									961	8.1	402
1974									983	8.3	384
1975									1 006	8.5	366
1976									1 029	8.7	348
1977									1 051	8.9	330
1978									1 074	9.1	330
TOTAL	1 560	av. 370	576 993	3 105	av. 365	1 134 081	11 861	100.0 ³ av. 425	5 041 722		
Totals alloc.											
to points	1 390	100.0 ³ av. 373	518 169	2 935	100.0 av. 363	1 066 421	11 861	100.0 av. 425	5 041 722		

1. Merit upgraders unallocated to specific points.

2. Asian females who cannot be allocated to specific points, averaged at the same average as other females. See footnote to page 60.

3. Totals differ due to rounding off.

TABLE 9. Projections grade B teachers, by year of graduation, point of salary scale, and total salaries, 1969 and 1979

Year of graduation original group	1967				1969				1979			
	Numbers in service	Point on scale f p.a.	Total salaries f		Numbers in service	Point on scale f p.a.	Total salaries f		Numbers in service	Point on scale f p.a.	Total salaries f	
unall. 1966 mu	138 ¹	av. M 348 av. F 330	40 716 6 930		128 ²	M 384 F 366 417 ³ av. M 378 av. F 362	43 008 5 856 144 396 12 670		85	636	54 060	
unall. 1967 mu									288	636	183 168	
1954 and prior	147	av. 492	72 324		123	av.	64 452		92	636	58 512	
1955 p	29	402	11 658		24	444	10 656		17	636	10 812	
1956 p	43	384	16 512		35	423	14 805		24	636	15 264	
1957 p	44	366	16 104		36	402	14 472		25	636	15 900	
1958 p	44	348	15 312		37	384	14 208		26	612	15 912	
1959 p	89	330	29 370		76	366	27 816		52	588	30 576	
1960 p	93	315	29 295		79	348	27 492		54	564	20 456	
1961 p	166	300	49 800		137	330	45 210		90	540	48 600	
1963 u/62 p	209	285	59 565		244	315	76 860		151	516	77 916	
1964 u/63 p	256	273	69 888		270	300	81 000		173	492	85 116	
1965 u/64 p	368	261	96 048		346	285	98 610		215	468	100 620	
1966 u	75	249	18 675		104	273	28 392		51	444	22 644	
1967 u					266	261	69 426		173	423	73 179	
1968 u					264	249	65 736		185	402	74 370	
1969 u									438	384	168 192	
1970 u									463	366	169 458	
1971 u									483	348	168 084	
1972 u									503	330	163 590	
1973 u									524	315	165 060	
1974 u									543	300	162 900	
1975 u									569	285	162 165	
1976 u									595	273	162 435	
1977 u									622	261	162 342	
1978 u									647	249	161 103	
TOTAL	1 701	av. 313	532 197		2 586		845 065		7 088	av. 359	2 544 834	

mu = Merit upgraders unallocated. p = Pre-service training. u = Upgrading. 1. 117 M, 21 F. 2. 112 M, 16 F. 3. 382 M, 35 F.

TABLE 10. Projection of grade C teachers, by year of graduation, point of salary scale, and total salaries, 1969 and 1979

Year of graduation original group	1967				1969				1979			
	Numbers in service		Point on scale		Numbers in service		Point on scale		Numbers in service		Point on scale	
		£ p.a.		£		£ p.a.		£		£ p.a.		£
1954 and prior	5 128 ¹	av. M 348	1 508 580		4 424 ²	av. M 372	1 399 830		3 152	444	1 399 488	
		av. F 330	261 690			av. F 358	236 638					
1955	836	285	238 260		735	315	231 525		549	444	243 756	
1956	690	273	188 370		607	300	182 100		464	444	206 016	
1957	558	261	145 638		491	285	139 935		377	444	167 388	
1958	481	249	119 769		422	273	115 206		331	444	146 964	
1959	272	237	64 464		237	261	61 857		119	423	50 337	
1960	306	228	69 768		232	249	57 768		120	402	48 240	
1961	412	219	90 228		248	237	58 776		71	384	27 264	
1962	665	210	139 650		443	228	101 004		44	366	16 104	
1963	694	201	139 494		549	219	120 231		21	348	7 308	
1964	678	189	128 142		654	210	137 340		14	330	4 620	
1965	835	180	150 300		803	201	161 403		29	315	9 135	
1966	619	180	111 420		596	189	112 644		39	300	11 700	
1967					622	180	111 960		77	285	21 945	
1968					347	180	62 460		45	273	12 285	
1969									27	261	7 047	
1970									406	249	101 094	
1971									578	237	136 986	
1972									831	228	189 468	
1973									1 093	219	239 367	
1974									1 405	210	295 050	
1975									1 532	201	307 932	
1976									1 458	189	275 562	
1977									1 492	180	268 560	
1978									1 519	180	273 420	
TOTAL	12 174	av. 276	3 355 773		11 410	av. 288	3 290 683		15 693	av. 285	4 467 036	
1. 4,335 M. 793 F. 2. 3,763 M. 661 F.												

TABLE 11. Changes occurring in certain important factors arising from projected enrolment and teacher needs and supply indexed to 1 000 (a) 1967 (b) 1969

	1967	1969	1979
Total number of teachers	1 000	1 086 1 000	2 268 2 090
<i>Average salaries</i>			
Grade A	1 000	986 1 000	1 149 1 164
Grade B	1 000	1 045 1 000	1 147 1 098
Grade C	1 000	1 043 1 000	1 033 990
all grades	1 000	1 066 1 000	1 208 1 134
Total salary bill	1 000	1 157 1 000	2 736 2 366

redistribution of the total force of each category on the points of the corresponding scale arising from survivors climbing to and then stagnating on the maximum point of the scale, (ii) losses to the category from various points of the scale due to upgrading, and (iii) the sizes of the different new cohorts fed into the bottom of the scale each year in relation to those remaining from the previous stock. The complete picture of the results of these factors is shown in tables 8, 9 and 10, and the most interesting one, grade A, is illustrated in figure 4.

Table 8 and figure 4 present an interesting picture. Changes in the average salary of teachers are sometimes attributed, at least partly, to an 'incremental creep' which is usually taken to imply a fairly steady annual rise due to the fact that teachers climb the scale. The case of grade A teachers illustrated here shows that the situation is not necessarily so. Initially there is a stock disproportionately weighted on the lower points of the scale. It is an expanding stock, fed predominantly by younger people, with a small supply of older promoted teachers. Since these younger teachers enter at the bottom point of the scale, the proportion on the bottom points initially gets larger (85.4 per cent on the four points £330 to £384 in 1969 against 78.7 per cent in 1967), and the average salary drops. This is followed by a steady input at the bottom, and as this input drops as a proportion of the expanding total, the downward trend of the average turns and the upward creep begins.¹

By 1979 the situation is closer to a 'stable' situation, but still has some way to go. The bottom ten groups of grade A teachers are the survivors from a regular output of newly trained teachers projected for 1969 to 1978, little affected by

1. Unfortunately it is not possible to include in this exercise the group of Asian women teachers discussed in appendix II, who cannot be allocated to points on the scale. This does not however detract from the argument, as like teachers are being compared with like, apart from the seventeen upgraded teachers in 1969 who could not be allocated to specific points but who are so few as to make no material difference.

losses through upgrading.¹ The remaining groups at the top of the 1979 histogram in figure 4 are the survivors from smaller, but growing, groups of earlier years and are therefore rather 'thin' in relation to a theoretical stable situation. Thus if the regular output were to continue the upper groups would become relatively larger and as more and more teachers reached stagnation on the maximum point so the average salary would continue to creep upwards. Yet even that hypothetical situation would eventually lead to stability and the creep would no longer function. In practice, of course, outputs of teachers who are fed into the bottom of the scale suffer changes from time to time as policies change, and moreover wastage and survival rates are likely to change over the years as changing human, social and economic factors come to bear on teachers.

Table 10 raises another interesting point. The fact that the average salary of a grade C teacher for 1979 works out almost the same as for 1969 is probably a coincidence, but an important influence at work in this group is the 'robbing' of the grade C force to feed grade B and the method of doing so. Each year groups of teachers, of significant size, are taken from those at the end of their fifth, sixth and seventh years of services and transferred to another category. This means that there is always a heavy weighting of grade C teachers on the five bottom groups, and this tends to hold the average salary of grade C teachers down. It is predominantly a young cadre. The figures for 1979 are, of course, distorted by the fact that the outputs of newly trained teachers from 1964 to 1969 were falling, and it has been presumed that the losses through upgrading in the 1960s, when needs have been fairly high, combined with wastage for other reasons, have reduced the survivors to negligible proportions. One would expect, therefore, that the average for grade C teachers would be likely to rise beyond 1979, subject of course to changes in policies and wastage rates.

An important factor influencing the whole of the complex pattern discussed above is the fact that the proportionate distributions of the teachers are influenced by the development of the very system in which they are to teach and the staffing formulae employed. If, for instance, a faster rate of increase of promotional opportunity from standard IV to standard V had been proposed, the need for at least three grade A teachers in each full primary school might have necessitated a larger output of such teachers per annum, which would affect the proportionate distribution of the total teacher force in 1979 among grades A, B and C. This would influence the proportionate relationship in the grade A category itself between the survivors from the 1969 stock, on the higher points of the scale, and those from the outputs of 1969 to 1978, thereby affecting the average salary of all grade A teachers in 1979.

1. See appendix II.

IV. Conclusions and policy implications

This study demonstrates that the temptingly simple method of using the current average of teacher salaries for costing an educational plan can result in dangerously misleading conclusions for policy decisions. If the total of 34,642 teachers projected for 1979 were costed at the £288 average of 1967, the estimated bill would be £9,976,896, *some 17 per cent short* of the more realistic total found in table 7. Even if the 1967 averages of £370 for grade A, £313 for grade B and £276 for grade C were used to cost the 1979 projections, the total would come to £10,938,382, *some 9 per cent short* of the total in table 7.

Many assumptions and reservations were necessarily made throughout this study, and it is based on limited initial data. Thus the actual figures which finally emerge must be treated with due caution. But the important point is that the results obtained are *possible*, and undoubtedly closer to the truth than the results which a more simple methodology would have yielded. From the observation in the preceding paragraph it is clear that the factors influencing teachers' salaries which were studied in this paper can be sufficiently important to warrant investigation when policies are being considered. As a basis for such a study, analysis of wastage rates of teachers and a summary of teachers by category, sex and point on salary scales would be very useful data.

There are two particularly influential factors of change to be watched: (a) the proportions of the total teaching force who belong to each category, and (b) the proportions of each category on the various points of the salary scale. These changes lead to annual changes in the average salary of the whole corps of teachers. When this is combined with a change in the total number, usually an increase, it is possible to obtain a reasonably close forecast of the effects of these influences on the total projected bill for teachers. And since teacher costs are by far the most important element in over-all recurring educational costs, it is well worth the effort to arrive at the closest possible estimate of them within the limits of available data.

It is worth emphasizing that the policies chosen have an important effect upon the level and trend of teacher costs as well, of course, as the quality of education and the supply of teachers. It is revealing, for example, to study the influence on the total bill of past and current policies, starting with the basic policies of staffing an educational sector with more than one category of teachers and paying teachers on incremental scales. At the opposite extreme, if all teachers were of the same category, paid on a flat non-incremental salary, the size of the total bill would be directly proportionate to the number of teachers. But the moment there are choices between categories, the situation begins to become complex. For example, the Tanzanian government's policy of increasing the proportion of grade A teachers and reducing that of grade C teachers has naturally given the average salary of the total corps an upward push.

The placing of each category on an incremental scale has a further complicating influence. The effects of this on the individual category are discussed in Section III

above and illustrated in figure 4. In the typical developing country situation, it is quite common to find a distribution pattern of the type shown for 1967 and 1969 in this diagram, initially with large proportions on the bottom points of the scale. As shown earlier, the average salary can actually drop for a time in the early stages of expansion, but ultimately the potential upward tendency implicit in this pattern begins to operate and the projected bill grows at a disturbing rate.

The case of Tanzania also highlights another policy issue, that of upgrading of teachers from category to category. There is something to be said for a policy of letting new entrants to a category of teachers settle down in service and prove themselves before taking the best of them and re-training them into an improved category. This is especially true if they stay in the same educational sector with the purpose of improving its quality. This practice has the effect of keeping the weighting of the lower category, grade C in the case of Tanzania, on the lower points of the scale while new teachers are going through the settling-down process. Ultimately, of course, the best of them 'reappear' as upgraded—and higher paid—teachers.¹ However, given that grade B teachers are to exist, if Tanzania had followed the alternative policy of pre-service training for such teachers instead of taking them from the grade C cadre, the total bill would have been higher, even by 1967, as there would have been more grade C teachers on the higher points of the scale. In general therefore the policy of selective in-service upgrading in the form in which it is practised in Tanzania, in contrast to a policy of more extensive pre-service training, results in a relatively lower *average* salary for the total corps of teachers in primary schools, in addition to the advantages of selection mentioned above.² Nevertheless, any policy of up-grading results sooner or later in an upward trend in average teacher salaries. The only question is how soon and by how much.

From these observations it is clear that a carefully costed bill for projected development is essential to help policy-makers to choose among alternative policies for the future. A badly costed bill may mislead them into decisions which may eventually have disastrous consequences. The illustrative targets used in this study are comparatively modest. They are certainly well short of the targets set at the Addis Ababa conference.³ The other assumptions are equally modest. The only fundamental structural change allowed for is a redistribution of teachers among the three categories to be employed to teach the classes at the different grades.⁴ And yet even these modest targets and assumptions, applied to the

1. These are the exceptions to the rule of 'no immediate financial advantage'. By their sixth, seventh and eighth year of service, when they 're-appear', they would only have reached the points £219, £228 and £237 respectively, and must therefore move up to £249, the entry point of the grade B scale (see appendix I).

2. To get the complete picture of the relative merits of this arrangement on financial grounds one would also, of course, have to include a comparison of the costs of the two types of training.

3. See *Final Report, conference of African states on the development of education in Africa, Addis Ababa, 15-25 May, 1961*, Paris, Unesco, 1961, chapter IV, table IV.

4. There is, for instance, no provision for reducing the sizes of classes or for over-all increases in teacher salaries.

twelve years from 1967 to 1979, result in multiplying the total number of teachers by about 2.25 and the total bill for their salaries by about 2.75.

The conclusion stands out that in costing the bill for projections of teachers, it is necessary to go fairly deeply into the full effects of alternative policies and the inter-action of the various elements which go to make up those policies. Such elements can be numerous, but this study shows that among them the following must be taken into consideration, along with their interrelated effects on one another:

- (a) the intake of pupils into the initial grade of a cycle which flows through the cycle;
- (b) the size of classes or other kinds of groups of pupils;
- (c) the division of teachers into categories, and the differentials between the salary scales of each category;
- (d) the role of the teacher and staffing policies, especially the identification of particular categories of teachers with specific grades of the educational system;
- (e) the policies on the methods of training and supply of teachers, especially pre-service training versus in-service training and re-grading;
- (f) the salary scale of teachers, numbers of incremental steps and the percentage increase in salary which each step represents, and policies on entry to and movement up the scales.

For each of these elements alternatives are possible. Consideration of the different results obtained from the permutations and combinations of such alternatives will give policy-makers a sounder basis for their choices and decisions.¹

Appendix I

Salary scales of teachers of grade A, B and C (Tanzanian £ per annum)

180	189	201	210	219	228	237	249	261	273	285	300	315	330	348	366	384	402	423	444	468	492	516	540	564	588	612	636
Entry point grade C					Entry point grade B					Entry point grade A	Maximum grade C	Maximum grades A and B															

1. In this connexion, it may be pointed out that the methodology used in this study lends itself to a mathematical model for the computer. And once programmed, rapid analysis of alternative programmes would be facilitated.

Appendix II

Methodological notes

It is not proposed to describe every detailed calculation of the methodology used to reach the results given in tables 7 to 10, but rather to explain the fundamental principles and illustrate them with examples. To a certain extent the methodology arises from the policies and practices of the situation being studied. This is especially true in this case with the procedures for upgrading teachers, whereby those for the regular courses are taken only from limited groups, with an *ad hoc* merit upgrading to cover those who were not given the opportunity to be considered for the regular courses. Anybody wishing to apply the principles of this study to a different situation would have to adapt the methodology to the practices of the authorities concerned in relation to staffing and supply of teachers for the educational sector with which he is dealing.

The survival index

However, the principle of the survival index, which is one of the bases of this methodology, could probably be applied generally. Unfortunately no statistics were available on recent trends in wastage rates of teachers for Tanzania, so calculations made for neighbouring Uganda in 1964 were used for the basis of assumed tables of survival indices.

The principle underlying the survival index is that in each year after the graduation of a group of teachers of the same sex a certain percentage of them is still in service. The original calculations for Uganda on which the rates used in this study were based are described elsewhere.¹ The numbers of each annual graduation group who were still in service in 1964 were counted and related to the total number who originally graduated, adjusted to take into account the particular circumstances of Uganda's upgrading system. The results, after the necessary adjustments, were tables of the type shown in table 1. These are used as tables of indices of survival. Thus, for instance, if in 1967 there were 200 male grade A teachers of the 1963 graduation group in service, i.e. in their fourth year of service, their survival index would be 97, indicating that they represent 97 per cent of the total number graduating in 1963. The index of the same group in 1969 would be 95, and one could therefore project that the number of that group in service in that year would be 95/97 times 200, or 196. In 1979 this group would be in their 16th year of service with a survival index of 69. Thus the projected number of survivors would be 69/95 times the 196 of 1969, or 142.

Upgrading of teachers

This simple procedure is, however, complicated by the practice of taking teachers from different graduation groups each year and removing them from one category to another. This complicates the calculations of survivors from each group, which is the basis of the methodology as is shown in tables 8 to 10 in the main text.

The selection of those to be upgraded also needs certain arbitrary decisions to enable estimates to be made of the numbers taken from each graduation group. The selection

1. John D. Chesswas, 'Educational planning and development in Uganda' in *Educational development in Africa*, volume I, Paris, Unesco: IIEP, 1969.

TABLE 1. Survival indices of teachers by category, sex and year of service since graduation

Year of service since graduation	Grade A		Grade B		Grade C	
	M	F	M	F ¹	M	F
1st	100	100	100	100	100	100
2nd	99	95	99	90	99	97
3rd	98	90	98	80	98	93
4th	97	85	97	70	97	90
5th	96	80	96	60	96	87
6th	95	77½	95	50	95	83
7th	93	75	93	45	94	80
8th	91	72½	91	40	93	77
9th	89	70	89	35	92	73
10th	87	67½	87	30	91	70
11th	84	65	84	25	90	68
12th	81	63	81	20	89	66
13th	78	61	78	15	88	64
14th	75	59	75	12	87	62
15th	72	57	72	10	86	60
16th	69	55	69	8	84	58
17th	66	53	66	6	82	55
18th	64	51	64	4	80	52
19th	62	49	62	2	78	50
20th	60	47	60	—	76	47
21st	58	45	58	—	74	44
22nd	56	43	56	—	72	41
23rd	54	41	54	—	70	39
24th	52	39	52	—	68	36
25th		2		2		

1. A study of the statistics relating to grade B women teachers from 1963 to 1967 indicates that there must have been high wastage rates. The equivalent Ugandan figures have therefore been modified to make the rates conform more to the statistics.

2. Uganda data for the equivalent of grade A and B only go as far as the 24th year of service. This fortunately coincides with the twenty-four years between the year of the earliest available statistics on graduation of teachers in Tanzania, 1955, and the target year, 1979. For the small proportion of surviving teachers from before 1955, rough wastage rates have been assumed, based on the general rates indicated by this table.

is made on the basis of observation and tests, and there is no indication as to how the distribution of the results of that selection among the various graduation groups may work out. In this study an arbitrary distribution has been taken. Taking the selection of grade C teachers for the regular courses as an example, it has been assumed that in any year all the survivors who are in their third, fourth and fifth years of service are eligible for consideration and that the numbers who are upgraded at the end of the course two years later are distributed among the three groups proportionately according to the survivors of each group in the year of selection.

The complications of these two factors are illustrated in table 2, which is a section of a continuous table which has been used to project survivors in 1979.

Taking those selected in 1975 and upgraded at the end of 1977 as the example, the three groups eligible are those in their third, fourth and fifth years of service, i.e. the groups graduating in 1972, 1971 and 1970. The 1970 group has already been 'in the hat'

TABLE 2. Projections of grade C male teachers by year of graduation and year upgraded to grade B, using (section of continuous table) survivors of each graduation group, 1968-1979

Year of graduation	Number of graduates	Selection 1973			Selection 1974			Selection 1975			Selection 1976			1979		
		upgraded end 1975			upgraded end 1976			upgraded end 1977			upgraded end 1978					
		Survivors 1973	up-graded	not up-graded	Survivors 1974	up-graded	not up-graded	Survivors 1975	up-graded	not up-graded	Survivors 1976	up-graded	not up-graded	Survivors	Index Number	Survivors
		Index Number			Index Number			Index Number			Index Number			Index Number		Index Number
1968	213	96	57 ¹	26	31.									90	29	
1969	97	97	49 ¹	22	27	96	26	8	18					91	17	
1970	927	98	908	409	485	97	480	155	325	96	322	80	242	92	232	
			1 014	457												
			100%	45.1%												
1971	927					98	908	293	615	97	609	151	458	96	453	102 35 ¹
							1 414	457 ²								
							100%	32.3%								
1972	927									98	908	226	683	97	675	152 523
											1 839	457				
											100%	24.9%				
1973	927													98	908	204 704
															2 036	457 ²
															100%	22.4%

1. The 57 is not 96 per cent of the 213 graduates, nor is the 49 97 per cent of the 97 graduates, because there have been intervening losses to upgrading selected in 1971 and 1972.

2. Total differs due to rounding off.

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twice. After the 1974 selection there are 325 of them left at an index of 97. In 1975 their index is 96 and those left who are eligible for consideration for the last time are 96/97 times 325, or 322. The 1971 group has had one opportunity and after the 1974 selection there are 615 left at an index of 98. In 1975 their index is 97 and there are 97/98 times 615, or 609, left who are eligible for consideration. The 1972 group enter the selection procedure for the first time in their third year of service, at an index of 98 from their total number of graduates of 927, leaving 908 survivors to be considered. The three groups of survivors are added together to make 1,839, from whom 457 are to be chosen.¹ This represents 24.9 per cent of all considered and they are divided at that proportion of each of the groups of survivors, i.e. 80 of the 1970 group, 151 of the 1971 group and 226 of the 1972 group, leaving 242, 458 and 683 respectively not selected. The 1970 group has now had its last chance and the 242 must carry on as grade C teachers. The 1971 group goes in for the last time, the 1972 group for the second, and in 1976 they are joined by the 1973 group for the next selection, and so the procedure continues.

TABLE 3. Projections of grade C teachers, by sex and year of graduation, 1969 and 1979

Year of graduation original group	1967			1969			1979		
	Numbers in service			Numbers in service			Numbers in service		
	M	F	MF	M	F	MF	M	F	MF
1954 and prior	4 335	793	5 128	3 763	661	4 424	2 822	330	3 152
1955	686	150	836	608	127	735	475	74	549
1956	566	124	690	501	106	607	399	65	464
1957	427	131	558	379	112	491	307	70	377
1958	373	108	481	331	91	422	272	59	331
1959	204	68	272	181	56	237	81	38	119
1960	227	79	306	168	64	232	76	44	120
1961	285	127	412	168	80	248	41	30	71
1962	441	224	665	288	155	443	25	19	44
1963	469	225	694	366	183	549	9	12	21
1964	445	233	678	436	218	654	10	4	14
1965	549	286	835	538	265	803	22	7	29
1966	407	212	619	399	197	596	30	9	39
1967				394	228	622	57	20	77
1968				213	134	347	29	16	45
1969							17	10	27
1970							232	174	406
1971							340	238	578
1972							507	324	831
1973							682	411	1 093
1974							890	515	1 405
1975							899	533	1 432
1976							908	550	1 458
1977							918	574	1 492
1978							927	592	1 519
TOTAL	9 414	2 760	12 174	8 733	2 677	11 410	10 975	4 718	15 693

1. The determination of this figure is explained in step 4 below.

2. Tanzania: II

The survivors, after upgrading has taken its 'toll' can now be projected to 1979. The 242 of the 1970 group remaining in 1975 have an index of 96. In 1979 they will be in their 9th year of service with an index of 92. Those remaining in 1979 can therefore be projected as $92/96$ times 242. Thus from the continuous table of which table 2 is part can be calculated the projections of the survivors of each annual graduation group, the results of which are shown in table 3, the totals forming the basis of table 10 in the text.¹

The whole of the methodology used in this study is based on these two principles, the survival index and the distribution of upgraders to different annual graduation groups. Table 2, combining the two techniques, illustrates the most complicated calculation used. In other cases one or the other has been used in turn.

Methodological steps

The steps of the methodology, with an occasional explanation where it is considered desirable, are as follows:

Step 1. Calculation of structure of stock of each category of teacher by point on the salary scale 1967

Statistics were available from various *Annual reports* on the outputs of teacher-training colleges from 1955 to 1966, and on the numbers upgraded each year after regular courses. Numbers of merit upgraders at the end of 1966 were supplied by Ministry of education officials. Most of this information was available by sex, but in certain cases calculations had to be made to come to an assumed breakdown of figures by sex. The Ministry of education also supplied information about the totals of salaries paid in December 1967, to stated numbers of teachers of each category in certain areas from which the information was available. These amounted to a little over a third of the total of grade A teachers, and a little under a half of the grade B and grade C teachers.

(a) Grade C

The procedure is similar to that used in table 2 with respect to the initial graduates and regular upgraders. The merit upgraders of 1966 are allocated proportionately to the survivors of each group in that year of longer service than those eligible for consideration for regular upgrading courses, i.e. those in their sixth year of service and above.² It should be noted in table 10 in the text and table 3 in this appendix that there is a residual block of teachers labelled '1954 and prior' who cannot be allocated to points because of lack of information about outputs from training colleges before 1955. They are arbitrarily attributed an average salary of the fourth point above that of the 1965 group for males and the third for females. This is consistent with a fairly heavy weighting on the next few points, which is quite probable in view of the fairly large outputs for 1955 to 1957, and moreover it results in an over-all average of £276 per annum, which is a little less than 8 per cent above the average of £256 for this category of teacher obtained from the sample of December 1967. These two results can be accepted as reasonably consistent.

(b) Grade B

Production of grade B teachers started as pre-service training and changed in the early 1960's to upgrading, with a certain amount of overlap. This is reflected in the p and u

1. Similarly tables 4 and 5 supply the bases of tables 9 and 8 in the text respectively.
2. See section I (Teachers) of main text.

TABLE 4. Projections of grade B teachers, by sex and year of graduation, 1969 to 1979

Year of graduation original group	1967			1969			1979		
	Numbers in service			Numbers in service			Numbers in service		
	M	F	MF	M	F	MF	M	F	MF
unall. 1966 mu	117	21	138	112	16	128	84	1	85
unall. 1967 mu				382	35	417	286	2	288
1954 and prior	147	—	147	123	—	123	92	—	92
1955 p	29	—	29	24	—	24	17	—	17
1956 p	43	—	43	35	—	35	24	—	24
1957 p	44	—	44	36	—	36	25	—	25
1958 p	44	—	44	37	—	37	26	—	26
1959 p	89	—	89	76	—	76	52	—	52
1960 p	92	1	93	78	1	79	54	—	54
1961 p	150	16	166	126	11	137	89	1	90
1963 u/62 p	168	41	209	206	38	244	146	5	151
1964 u/63 p	204	52	256	229	41	270	166	7	173
1965 u/64 p	267	101	368	270	76	346	202	13	215
1966 u	22	53	75	55	49	104	43	8	51
1967 u				202	64	266	161	12	173
1968 u				213	51	264	174	11	185
1969 u							384	54	438
1970 u							398	65	463
1971 u							407	76	483
1972 u							416	87	503
1973 u							426	98	524
1974 u							434	109	543
1975 u							439	130	569
1976 u							443	152	595
1977 u							448	174	622
1978 u							452	195	647
TOTAL	1 416	285	1 701	2 204	382	2 586	5 888	1 200	7 088

mu = merit upgraders unallocated.
p = pre-service training.
u = upgrading.

suffices to the years of graduation in table 9 in the text and 4 in this appendix. From the point of view of the position on the salary scale, the 1962 graduate from pre-service training, for instance, is equivalent to the 1963 upgrader, because the former is subject to two years' stagnation on the bottom point during his probationary period while the latter is not. An important methodological principle in this connexion is that, when a teacher is upgraded he is presumed to assume the characteristics of the salary group which he joins on upgrading, and is therefore absorbed into that group with its survival index.

This category of teacher had both gains and losses as a result of merit upgrading at the end of 1966, and one detail arising from this is the gain of a group, shown as 'unall. 1966 mu' in table 9 and appendix, table 4, who were upgraded from the grade C groups of 1954 and prior, who had originally to be assigned average salaries, which they could carry across on upgrading. The difference between these upgraders and their peers whom they left behind is that now all of them receive increments, including those who had been stagnating on the maximum point of the grade C scale. This means that their average will rise at a faster rate in future years than those left behind.

2. Tanzania: II

The average of £313 per annum for this category of teacher found by this procedure is only 5 per cent less than the £329 calculated from the sample. These two results also are therefore reasonably consistent.

(c) Grade A

This category is predominantly produced from pre-service courses. There were small gains and losses from merit upgrading at the end of 1966, but estimating the structure of this cadre is largely a matter of simply applying the survival indices. One difficulty is the allocation of the pre-1961 grade I teachers to the new grades A and B.¹ This is achieved by a proportionate allocation according to the residue of the 1967 stock of each after the survivors of the 1961 to 1966 graduation groups have been deducted. In the case of women teachers these figures are negligible. Very few were produced before 1961.

Another problem with this category is the existence, mainly in the two large towns, Dar-es-Salaam and Tanga, of a significant number of Asian women teachers who were not trained in Tanzania. There is no information available about their years of graduation, and they therefore cannot be allocated to points on the scale. Their numbers have been assumed on the basis of calculations made from the 1967 educational statistics, and their average salary is assumed to be the same as that of equivalent Tanzanian women grade A teachers.

The average salary of this category of teacher found by this procedure is only 2 per cent below the £380 calculated from the sample. These two results also are therefore reasonably consistent.

Step 2. Calculation of the total bill for basic salaries of teachers in public primary schools 1967

This is a simple matter of multiplying the numbers of each category in table 3 (p. 48) by the averages in tables 8 to 10 in the text, calculating the average of teachers of grades A, B and C together, £288, and applying that average to the 'other trained' of table 3, who are of negligible proportions. The result was shown in table 7 in the text.

This is tested for feasibility against the 1966 situation, which is taken from table E.2 on page 88 of the *Annual report of the ministry of education, 1966*, (op. cit.). The 2,300,000 shs. for voluntary agency schools directly aided by the government shown in the footnote to that table was probably in respect of teachers in demonstration schools of teacher-training colleges, and if this sum is added to the total of item 1 in the table, the result is 80,554,946 shs. or about £4 028 thousand. The £4,405 thousand of table 7 of this study is some 9 per cent higher than this figure, and the average salary of all teachers rises about 6 per cent from £272 in 1966 to £288 in 1967. From table 3 the total number of teachers increased by a little over 3 per cent. The proportion of grade A teachers, whose initial point is higher than the average of all teachers, rose slightly, but so did that of grade C teachers. However, table 10 shows that the new teachers on the bottom point of this category in 1967 are only about 5 per cent of all grade C teachers, and as a group they are smaller than the next four groups above, a situation lending itself to a significant incremental creep. Moreover, a few of the upgraded teachers did get a rise in salary, because their point on their old scale in 1967 would have been below the minimum point of their new scale.

1. See section I (Teachers) of main text.

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TABLE 5. Projections of grade A teachers by sex and year of graduation, 1969 to 1979

Year of graduation original group	1967			1969			1979			
	Numbers in service			Numbers in service			Numbers in service			
	M	F	MF	M	F	MF	M	F	MF	
1954 and prior	81	—	81	74	—	74	}	69	—	69
1967 m.u.u. ¹				17	—	17				
1955	15	—	15	13	—	13		9	—	9
1956	21	—	21	19	—	19		13	—	13
1957	22	—	22	20	—	20		14	—	14
1958	22	2	24	20	2	22		14	1	15
1959	42	1	43	38	1	39		26	1	27
1960	44	1	45	40	1	41		28	1	29
1961	37	7	44	36	7	43		25	5	30
1962	59	25	84	59	22	81		39	15	54
1963	53	28	81	54	25	79		35	16	51
1964	108	67	175	111	60	171		74	37	111
1965	208	71	279	214	64	278		155	39	194
1966	394	82	476	483	94	577		371	60	431
Unknown ²	—	170	170	—	153	153		—	—	—
1967				506	714	680		404	109	513
1968				575	223	798		473	140	613
1969								663	197	860
1970								679	205	884
1971								694	212	906
1972								713	221	934
1973								731	230	961
1974								743	240	983
1975								751	255	1 006
1976								759	270	1 029
1977								766	285	1 051
1978								774	300	1 074
TOTAL	1 106	454	1 560	2 279	826	3 105		9 022	2 839	11 861

1. Merit upgraders unallocated to specific points.

2. Asian females who cannot be allocated to specific points, averaged at the same average as other females. See p. 71.

Taking all these points into consideration, a 9 per cent rise in the total salary bill between 1966 and 1967 is considered feasible, and the situation for that year in tables 3 to 5 above can therefore be taken as a reasonable basis for calculation of the costing of projections of teachers.

Step 3. Projection of stocks of teachers 1969

The 1969 situation regarding the stock of teachers can be calculated from the stock of teachers and the numbers in training, both pre-service and in-service, in 1967, and the number of merit upgraders at the end of that year. In the absence of any indications as to policy on the subject, it is assumed that the merit upgrading was a temporary affair intended to do justice to teachers who did not get the opportunity to join regular courses and that it will not be repeated.

Crude flow rates through teacher-training courses are calculated from statistics taken from the *Annual report of the ministry of education, 1967* (op. cit) and are applied to the 1967 enrolments in teacher-training courses to project outputs at the end of 1967 and 1968. Merit upgraders at the end of 1967 are allocated to groups in a manner similar to that described in (a) above, and the survivors of the 1967 stocks, the two outputs and the upgraded groups are projected by the use of the survival index modified by upgrading calculations of the type of table 2 above, where applicable, resulting in 1969 stocks by point on the salary scales as shown in tables 3 to 5.

It should be noted that for some groups the stocks in 1969 are larger than those for 1967, due to the addition of merit upgraders to those groups at the beginning of 1968. In table 4 the grade B category gains yet another unallocated merit upgrading group at the top of the table, who also emanate from the unallocated grade C teachers of the graduation groups of 1954 and prior, and so now does Grade A, albeit a small group, who derive from the unallocated grade B teachers of the graduation groups of 1954 and prior (see (b) above).

Step 4. Calculation of the total bill for basic salaries of teachers in public primary schools 1969

The first large outputs of Tanzanian teachers for secondary schools took place at the end of 1968, at a time when the secondary system was expanding. It is assumed therefore that the numbers of teachers of grades A, B and C in sectors of the educational system other than public primary schools will be much the same in 1969 as they were in 1967. This would leave for public primary schools the numbers shown in table 7. From table 6, omitting the classes at standard II from the 1969 figures, (since that grade is taught by the teachers of standard I), the total number of classes needing teachers is 15,767.¹ The projected stock of 16,578 teachers of grades A, B and C in table 7 is just over 5 per cent more than the minimum needs. There should therefore be no further need for 'other' teachers, and the construction of the bill is a simple matter of multiplication and addition.

Step 5. Projection of stocks of teachers 1979

(a) Grade A

The 1967 statistics show only a small number of grade A teachers in courses for upgrading to E.O.III, which is mainly a pre-service course for candidates completing the final grade of secondary education. With the expansion of secondary education competition for entry to this course may well intensify, and it is therefore assumed that losses from the grade A category to upgrading will be no more than those indicated in the 1967 statistics.

The Minister's figure of 1,100 entrants for grade A training in 1968 is taken as the standard figure for 1968 to 1977. They are divided between males and females in the same proportion as the enrolment in the first grade of the course in 1967, i.e. 790 males and 310 females. The analysed crude flow rates through the course are applied to them, giving an annual output at the ends of 1969 to 1978 inclusive of 774 males and 300 females. These ten outputs and the 1969 stock are projected to 1979, using the survival indices, and the few upgraders to E.O.III are subtracted from each group, giving a

1. See page 52 of the main text.

projected stock of 11,861 grade A teachers in 1979 distributed on the points on the salary scale as shown in table 8 in the text and table 5 above.¹

The projected number of supernumerary grade A heads of schools in 1979 is 1,011. These are added to the numbers of classes at standards V to VII in table 6, giving a total need for grade A teachers of 11,223. There are therefore 638 teachers projected additional to need, who can be allocated to standard IV, thereby fulfilling the minimum of three grade A teachers per full primary school with a small margin to spare.

(b) Grade B

This leaves 6,072 classes at standard IV to be staffed, and it is assumed that they will need grade B teachers. There will also be a need for 1,011 supernumerary home economics teachers, making the total needs for grade B teachers 7,083, of whom at least 1,011 must be female. The total is therefore arbitrarily divided into 5,883 males and 1,200 females.

When the 1969 grade B stock is projected to 1979, using the survival indices, the total of their survivors amounts to 1,641 males and 60 females. Therefore the survivors in 1979 of the outputs for 1969 to 1978 of the regular courses for upgrading teachers from grade C to grade B must be 4,242 males and 1,140 females. If M is the annual number of males upgraded from 1969 to 1978 inclusive, by the use of the survival index the following equation can be formulated:

$$\frac{M}{100} (99 + 98 + 97 + 96 + 95 + 93 + 91 + 89 + 87 + 84) = 4,242.^2$$

The solution to this equation is $M = 457$. In a similar manner the annual output of 217 females is arrived at, and tables 4 above and 9 in the text can now be completed.³ It should be noted, in all of tables 8 to 10, that the graduation groups of 1954 and prior will all have reached the maximum point of the scale by 1979 and that the effects of averaging their salaries in earlier years now disappear.

(c) Grade C

Standards I to III are to be staffed by grade C teachers, with no additional teachers for standard II. The total of classes at standards I and III in table 6 for 1979 is 15,699, and this will be the stock of grade C teachers required. The data on page 49 showed that female grade C teachers were 22.7 per cent of the total grade C force. There is now to be a new type of female grade C teacher for standard I, and one would expect their percentage to rise.⁴ They are therefore arbitrarily fixed at 30 per cent in 1979, which would divide the target stock at 10,989 males and 4,710 females.

If the 1967 stock of grade C teachers is hypothetically projected forward to 1969

1. It is assumed that by 1979 the aim will be to have Tanzanians occupying all teaching posts in all sectors of the educational system with correctly qualified teachers. There will therefore no longer be any need for primary school teachers in other sectors of the educational system, nor for the assistance of expatriates, including the Asian women teachers mentioned earlier in this appendix.

2. Since these are teachers already in service, wastage is assumed immediately after graduation from the upgrading course, and the above list therefore starts with the index for the second year of service.

3. The small difference between the total of males in table 4 and the number required in the text above arises from rounding. The same applies to table 3.

4. See section I (Relevant policies) of main text.

without the complications of upgrading, the gross result works out at a loss of male teachers at about 1.5 per cent per annum and females at 3.6 per cent per annum. These figures are used to make the following first crude calculation of annual outputs of grade C teachers needed to achieve the above targets:

1. Net increase in stock

	1979	1969	M	F
M	10,989	— 8,733	= 2,256	
F	4,710	— 2,677	=	2,033

2. Replacement of teachers upgraded

4,570 2,170

3. Replacement of wastage (approx.)

$$\begin{aligned} \text{M} & \frac{8,733 + 10,989}{2} \times 0.015 \times 10 & 1,479 \\ \text{F} & \frac{2,677 + 4,710}{2} \times 0.036 \times 10 & 1,329 \end{aligned}$$

Total outputs needed for 1969 to 1978 8,305 5,532

Less projected outputs 1969 from entry 1968¹ 97 61

Total outputs needed for 1970 to 1978 8,208 5,471

Thus there is a need for an output of 912 males and 608 females for each of the nine years, 1970 to 1978.

The 1969 stock and these outputs for 1969 to 1978 are then projected to 1979 by the use of the survival indices and distribution of upgraders in the manner of table 2.²

Because the wastage rates used in the first estimate of annual outputs were only approximate, the total stock in 1979 found by the above calculation is a little different from the needs, for instance for males, 10,862 against 10,989. This difference is so small that it could be accepted, but to illustrate the complete methodology, it is corrected in the following manner.

The total is 127 short of the needs. The outputs for 1969 to 1978 must therefore be raised so that the survivors from the additional outputs come to that figure. The average of the first nine survival indices is ninety-six, so the total outputs needed to achieve these additional survivors would be raised by $127 \times 100/96$, or 132, making an additional fifteen per annum for the nine years. The figure of 912 found previously is thus raised to 927, and the survivors recalculated, giving the results shown in table 3 above. Table 2 is a part of this recalculation.³

1. Calculated from information given in the Minister's speech of June 1968.

2. In this particular case a difficulty arises. Since the outputs from grade C pre-training courses have been progressively reduced during the current development plan period, 1964-69, the numbers from those graduation groups available for consideration for upgrading become so low that real selection becomes almost impossible. One almost would have to take all available. An arbitrary decision has therefore been made that the total number considered must be at least double the number chosen, which means that for the selection in 1970 for those upgraded at the end of 1972, the survivors from six graduation groups, 1962 to 1967, have to be considered; for the selection in 1971 for those upgraded at the end of 1973, eight graduation groups, 1961 to 1968, have to be considered; and for the selection in 1972 for those upgraded at the end of 1974, eleven groups, 1959 to 1969, have to be considered. Thereafter the availability for consideration of the survivors of the annual outputs of 912 in the 1970s obviates any further departure from the rules.

3. The discrepancy between the final 10,975 and the needed 10,989 arises from a series of roundings.

Step 6. Calculation of the total bill for basic salaries in 1979

The final bill is then a matter of summary, as was shown in table 7. From this table are calculated the indices summarized and discussed in the main text, and it is the basis for the construction of figure 3, p. 54.

Appendix III

Indices of per capita GDP and average primary teacher's salary in Tanzania, 1963-79

	GDP constant price (£ thousands)	Population (thousands)	Per capita GDP (£)	Index	
				Per capita	Average teacher's salary
1963	197 538	10 868	18.2	100	100
1964	210 462	11 194	18.8	104	99
1965	213 550	11 530	18.5	102	98
1966	233 450	11 880	19.6	108	100
1967	238 950	12 231	19.5	107	107
1968	244 000	12 598	19.4	107	103
1969	259 860	12 967	20.0	110	106
1970	276 751	13 356	20.7	114	110
1971	294 740	13 757	21.4	118	113
1972	313 898	14 170	22.2	122	116
1973	334 301	14 595	22.9	126	120
1974	356 031	15 033	23.7	130	124
1975	379 171	15 484	24.5	134	128
1976	403 817	15 949	25.3	139	132
1977	430 065	16 427	26.2	144	136
1978	458 019	16 920	27.1	149	140
1979	487 790	17 428	28.0	154	145

NOTES 1. Data for 1963-68 are actual data for GDP; but for average teacher's data, actual figures are available only for 1963-67.
 2. An annual growth rate of 6.5 per cent for the GDP, assumed in *Tanzania: second five-year plan for economic and social development*, Vol. I, has been used to project the GDP, while 3 per cent annual rate of growth has been used for projecting the population - (see table 1, p. 43, footnote No. 2).
 3. Indices are calculated from constant prices of per capita GDP and average teacher's salary.

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3

Costing first- and second-level
general education

*Prepared by Jinapala Alles, W.D. Fernando, D.P. Wijegunasekera, D. Gunaratne,
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The report has been prepared at the request of IIEP by a group of experts and researchers from the Ministry of education, Ceylon. The group, headed by Dr. Jinapala Alles, Deputy Director-General of secondary education, included Messrs. W.D. Fernando, D.P. Wijegunasekera, D. Gunaratne, M.A. de Silva and C. Hettiarachchi. Additional information was provided by Mr. de S. Wéerasuriya. The authors used official statistics and several reports, to which reference is made in the Bibliography. Mr. D.G. Dayaratne, Permanent Secretary to the Ministry and Director-General of education provided much encouragement to the authors of the report.

In order to clarify some points, the staff of the IIEP have added comments in the form of footnotes and included a general commentary at the end of the study.

Introduction

The nature and scope of the study

The aim of this study is to describe and analyse Ceylonese experience in the use of cost analysis in educational planning—both short- and long-term planning.

It is concerned with primary and secondary—first- and second-level— general education as they have developed in the 1960s and the prospects for the 1970s. The study has not been an academic research project; it is based upon normal, everyday work carried out by managers responsible for the educational system. It attempts to do no more than lay the basis for more detailed and ambitious work in the future.

The Ceylonese educational system is a centralized one involving 2.5 to 3 million pupils in over 10,000 schools, about 100,000 teachers and a recurrent direct state financial commitment of the order of some 400 million Ceylon rupees per year (approximately US \$60-70 million) (1,9).¹

The study will attempt to illustrate the relation between unit cost analysis and the structure and design of annual budgets and perspectives (10, 11, 12 and 13). It will also indicate how unit cost analysis revealed one or two major examples of imbalance within the educational system. However, the period that this case study covers is too short to allow one to draw too precise conclusions as to what corrective action is necessary.

1. Outline of first- and second-level general education

The Ceylonese educational system is an adaptation of a common pattern to be found in the U.K., India, etc.(14).

The two most important educational policy decisions (9) taken in the last three decades have been (i) the abolition of tuition fees and the establishment of free education in 1945 (43, 44); and (ii) the 'takeover' of all schools (other than a small number, accounting for about 3 per cent of the total enrolment) for comprehensive state financing and over-all state management in 1960 (45, 46).

In addition a minimal midday meal is provided but books and other supplementary items are not available free. A very small percentage of pupils receive bursaries which partially cover such needs and a further small percentage of needy children are assisted by means of free books.

The current participation rate in the first level of general education (age-group 5+ to 12+) is approximately 80 per cent of the age-group; the participation rate

1. References in brackets are to the relevant numbers in the bibliography.

in the second level (age-group 12+ to 17+) is significantly lower and ranges from 30 to 40 per cent. As in many other countries, both these participation rates have increased rapidly during the last two or three decades (13, 15, 8).

First-level education is provided in about 9,000 schools reasonably evenly distributed over the island. There are about 1,500 secondary schools, but they are not as evenly distributed (13).¹

In both levels of general education the physical facilities provided vary considerably from school to school. There are also significant variations in standards of academic attainment, depending to some extent on rural/urban factors, or the socio-economic levels of the communities in which the schools are located.

In 1967 and 1968 the Ministry of education took several steps towards the reorganization of the school system. The schemes for reorganization provide for first-level education to cover grades 1 to 7 and second-level general education grades 8 to 12. Grade 8 is strictly speaking the last grade of first level but it is placed in second level. This has been done so that grade 8 can be used for preparing pupils for the diversified secondary education programmes from grade 9 onwards. (See figure 1.)

In absolute terms the school population has increased from 2.2 million in 1960 to about 2.5 million in 1966, which in fact indicates a slight decrease in the rate of enrolments compared with the rate of increase of the corresponding age-group. Pupil/teacher ratios have remained at about 30:1 throughout the period 1960-68 (8, 13). (See table 1).

Of the 100,000 teaching force, 30 to 40 per cent are non-qualified teachers. In senior second-level education the percentage of non-qualified teachers is minimal and nearly 40 per cent of the teachers are university graduates or hold comparable qualifications (18). Detailed statistics relating to qualification, age, salary structure, etc. are not readily available.²

The development of the first and second-level educational system over the next few years has been examined in short-term plans (11) and in terms of a perspective (13) extending to 1977.

Throughout the 1950s and 1960s the Ceylonese government has laid great stress on the quality of education, especially as regards the upper grades of the first level. The corresponding changes at second level have taken the form of curriculum development programmes and diversification programmes with some extension of physical plant and other facilities, particularly in rural schools. At the same time the quality of the teaching force has been progressively improved.

1. The implication is that either there are different participation rates for rural and urban areas or that there are boarding schools for children from rural areas. No mention is made of extra cost of these boarding schools. (IIEP)

2. These statistical data are essential in studies of this kind. Little can be done to assess the cost of programmes for improving the quality of education if they are not available. It is difficult to establish unit costs in first- and second-level schools without them, since the major part of recurrent expenses is made up of teachers' salaries. The following information is essential: (i) a description of salary structure and how it works; (ii) a list of differentials by level of qualifications and between first- and second-level teachers; (iii) are there in-grade steps which the teacher climbs on the basis of years of service?; (iv) does in-service training result in promotions and salary increase? (IIEP)

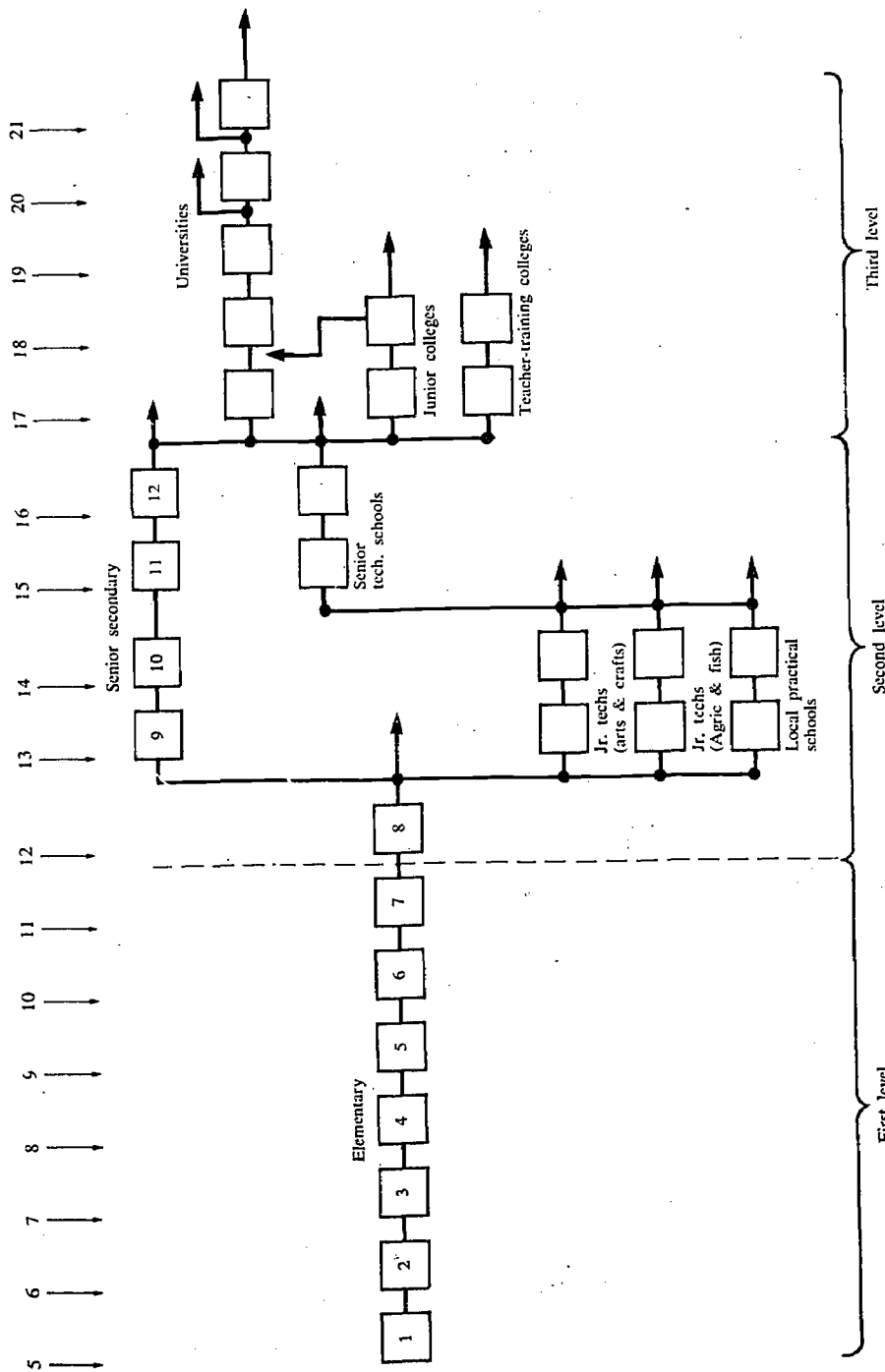


FIGURE 1. The school system.

TABLE 1. Pupil/teacher ratio, 1960-68

	1960	1962	1964	1966	1968
Pupil/teacher ratio	31	30	27	28	28

NOTE Available data do not permit resolution between first and second level.

The over-all programme of quantitative development and qualitative improvement has caused considerable financial strain on the national resources. Ceylon spends nearly 5 per cent of the gross national product (GNP) on education. (Table 2). It is anticipated that this level of commitment to education will be continued during the 1970s. While the rate of growth of GNP was slow in the first part of the 1960s, it has recently increased to about 8 per cent annum. In projection analysis a 6 per cent rate of growth is assumed by the national planning authorities.

Between 1960 and 1968, governmental revenue was the sole source of educational finance (funds voted by parliament for the specific purpose of education in the Annual Appropriation Act). In the 1940s and 1950s there were various sources of finance. In addition to the government, a multitude of denominational and other agencies participated in the management and provision of education. In the 1950s all recurrent and capital costs in the government schools were met from national revenue; in the assisted schools all recurrent costs were met from governmental revenue and a substantial portion of the capital costs were borne by the agencies which managed the schools. Records of most of these latter contributions are not readily available for examination.

TABLE 2. Recurrent expenditure on education by levels, 1952-66 (thousands of rupees)

Year	Level I & II general	Level II technical	Level III university	Total	Percentage of GNP
1952	114 664	1 063	4 285	120 012	2.7
1956	162 681	850	6 516	170 047	3.4
1960	269 716	1 291	10 771	281 778	4.6
1962	271 984	1 696	13 059	286 739	4.5
1964	308 052	1 764	14 932	324 748	4.7
1965	311 301	2 025	16 000	329 326	4.5
1966	319 119	2 426	18 466	340 011	4.5

NOTE These figures refer to costs borne by the Ministry of education in providing organized educational programmes. They do not include the costs of educational programmes financed by other ministries

SOURCE Bibliography (26 and 27).

However, in a small number of schools with pupils coming from the middle and upper socio-economic strata of the community, a small fee called the 'facilities and services fee' is still optionally paid. The amount collected, in comparison with the total governmental allocation, is negligible. It probably does not exceed 2 million rupees and is used to finance sports and other extra-curricular activities.

In Ceylon contributions to education from local bodies and other agencies are

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negligible. Some legislative provision exists for the management of education by local bodies, but it has remained in abeyance. Suggestions for more active participation by local communities, taking the example of the local authorities in the United Kingdom and some other countries, have been made from time to time, but the matter has not been pursued (16).

Significant amounts of external resources (foreign aid) have been channelled into education. These inflows of resources have at times exerted a critical stimulating influence on the system as a whole, but in absolute terms such resources have been small and of the order of 5 per cent of the educational budget.

Present knowledge about investment trends in the field of education, while being better than in some countries (34), is incomplete in Ceylon. Moreover, whatever data are available have been collected prior to the emergence of current concepts in the field of educational economics (33, 24). To that extent, the analytical significance that can be attached to the information is limited.

II. Cost analysis of first- and second-level general education and the identification of some significant aspects of unit costs

In this study the term 'costs' is used to signify direct school expenditure as shown in national expenditure statements, i.e., the direct costs of the formal school system to the government. Some of the stages of the analysis involved transformations of these data but the bases of assumptions made are stated at the appropriate points in the text.

This cost analysis will deal mainly with recurrent expenditure. In the use of the term 'educational expenditure' the following components are considered as constituting the total direct expenditure (5):

- (a) the direct salary and the allowances paid to teachers and non-teachers;
- (b) provident funds and pension fund contributions;
- (c) organizational and administrative costs of the educational system—both salary and non-salary;
- (d) teacher-education costs, both salary and non-salary;
- (e) facilities, services and maintenance costs of the school system;
- (f) pupil welfare costs, including expenditure on school meals, residential hostel services and bursaries to pupils.

Some of the expenditure items referred to relate to facilities provided in the hostels, but the analysis is not carried far enough to isolate this expenditure. It is included in the pupil welfare costs.

In so far as only direct school expenditures are involved, the costs borne by

parents are not included. Average expenditure per spending unit on education, expressed as a proportion of total consumer expenditure per spending unit, was approximately 2.0 per cent in 1953 and 1.8 per cent in 1963. Furthermore, indirect 'social costs' are not taken note of, though they may be significant. In the second level the 'opportunity costs' of pupils' time are not considered.

The schools are owned and maintained by governmental agencies such as the Ministry of education. In principle one should take into consideration some 'shadow rents' of the school buildings, or else provide some appropriate estimates of interest and depreciation on the capital. This has not been done. In the analysis, unit costs are worked out in terms of the 'costs per pupil-year', the pupil numbers being the enrolments figures. Because of limitation of data, 'unit cost per graduate output' is not worked out.

Several significant aspects of unit costs will emerge in the analysis presented in section A below; a particular operationally valuable feature is isolated in section B for specific comment. In all instances current prices are used, except in projections when the particular base year prices are used.

A. Cost analysis of first- and second-level general education

The total recurrent expenditures which have been incurred in first- and second-level general education, *together*, for the years 1960-68 are given in table 3. Table 4 shows the anticipated resource allocation to education for the period 1968-77 broken down for first- and second-level education.

The total cost of first- and second-level education is also shown as a percentage of GNP in Table 3. In addition it is indicated as a percentage of total revenue.

TABLE 3. Total recurrent expenditure on first- and second-level general education, (in thousands of rupees)

Year	Expenditure	Percentage of GNP	Percentage of total government revenue
1960	269 716	4.3	19.2
1962	271 984	4.2	16.8
1964	308 052	4.2	17.5
1966	319 119	4.2	17.4
1968	340 482	3.7	15.5

SOURCE. Extracted from bibliography (13).

The total recurrent costs given in table 3 are analysed in terms of:

1. Teacher, non-teacher and pension/provident fund and other salary components. This component will be referred to as the *teacher and non-teacher salary component* (TNS Cpt.);
2. Organizational and administrative charges (both salary and non-salary). This

TABLE 4. Recurrent cost projections—first- and second-level general and education

Year	Level I grade 1-7				Level II grade 8				Level II grade 9-12				Gr. 1-12 Percentage of GNP
	Unit Cost ¹	Enrol-ment ²	Expenditure ³	Unit Cost ¹	Enrol-ment ²	Expenditure ³	Unit Cost ¹	Enrol-ment ²	Unit Cost ¹	Enrol-ment ²	Expenditure ³	Gr. 8-12 Expenditure ³	
68/69	144.8	1 940	280 980	144.8	143	20 706.4	333.0	321	106 893.0		127 599.4	408 570.4	4.0
69/70	146.9	2 129	312 750	146.9	135	19 831.5	338.0	338	114 244.0		136 475.5	449 225.5	4.1
70/71	149.1	2 165	322 801	149.1	150	22 365.0	343.0	340	116 620.0		138 985.0	461 786.0	4.0
71/72	151.4	2 071	313 549	151.1	279	42 156.9	348.3	353	122 949.9		165 106.8	478 655.8	3.8
72/73	155.2	2 092	324 678	155.2	179	27 780.8	357.1	482	172 122.2		199 903.0	524 581.0	4
73/74	159.2	2 088	332 410	159.2	235	37 412.0	366.4	567	207 748.8		245 160.8	577 570.8	4
74/75	163.3	2 108	344 236	163.3	194	31 666.2	375.9	487	183 063.3		214 743.5	558 979.5	4
75/76	167.6	2 128	356 653	167.6	194	32 514.4	385.9	518	199 896.2		232 410.6	589 063.6	4
76/77	172.2	2 149	370 058	172.2	200	34 440.0	396.3	485	192 205.5		226 645.5	596 703.5	4

source Extracted from bibliography (13).

3. In thousands of rupees.

4. Projected GNP not available.

NOTES

1. In rupees.

2. In thousands.

will be referred to as the *administration component*, and includes the salary costs and related costs of the school inspection services (A Cpt.);

3. The direct costs of maintaining the instructional programmes (items such as teaching materials, maintenance of services and facilities, maintenance of buildings, electricity, etc.) This component will be referred to as *facilities, services and maintenance component* (FSM Cpt.);
4. Teacher education—pre-service, in-service, curriculum reconstruction, action research for improvement of school practices, etc. This component will be referred to as the *teacher education—pre-service, in-service—and quality improvement component* (TEQI Cpt).
5. Pupil welfare, including midday meal, bursaries, hostel costs, etc., but excluding the cost of raw materials for the midday meal (which amounted to approximately 24 million Ceylon rupees in 1959). This component will be referred to as the *pupil welfare component* (PW Cpt).

The analysis of costs by purposes is indicated in table 5.

The structure of the statements of accounts of the government of Ceylon and the budgetary methods practised do not permit a *direct* calculation of first- and second-level general education recurrent costs *separately* (25). Nevertheless, it is important to try to separate the costs of the two levels, and an attempt has been made on the basis of a selected matrix of assumptions. Unit costs shown in table 6 have been derived on these assumptions. These unit costs are further analysed in terms of their percentage contribution to the total unit cost, and this is shown in table 7.

The unit costs which have been derived for second-level general education are plotted graphically in terms of total unit costs, salary unit costs, and non-salary unit costs in figure 2. This chart indicates important aspects in the unit costs and these will be discussed later.

B. Some significant aspects of unit costs

The unit costs and sub-unit costs when examined closely by purpose show several significant aspects.

In figure 2 one obvious feature is that the average unit cost for the second level has been increasing over the period 1952 to 1968, with the exception of a reduction during the period 1964 to 1966.

The rate of increase of unit costs is not uniform and would appear to have accelerated during the period 1952 to 1962; it then levelled off, fell, and then increased rapidly.

The same features can be seen in salary unit cost,¹ the major component of unit cost. However, it is worth noting that the non-salary² component of total unit cost does not alter in the same way. The change is in fact markedly different:

1. (TNS + A + TEQI) components.

2. (FSM + PW) components.

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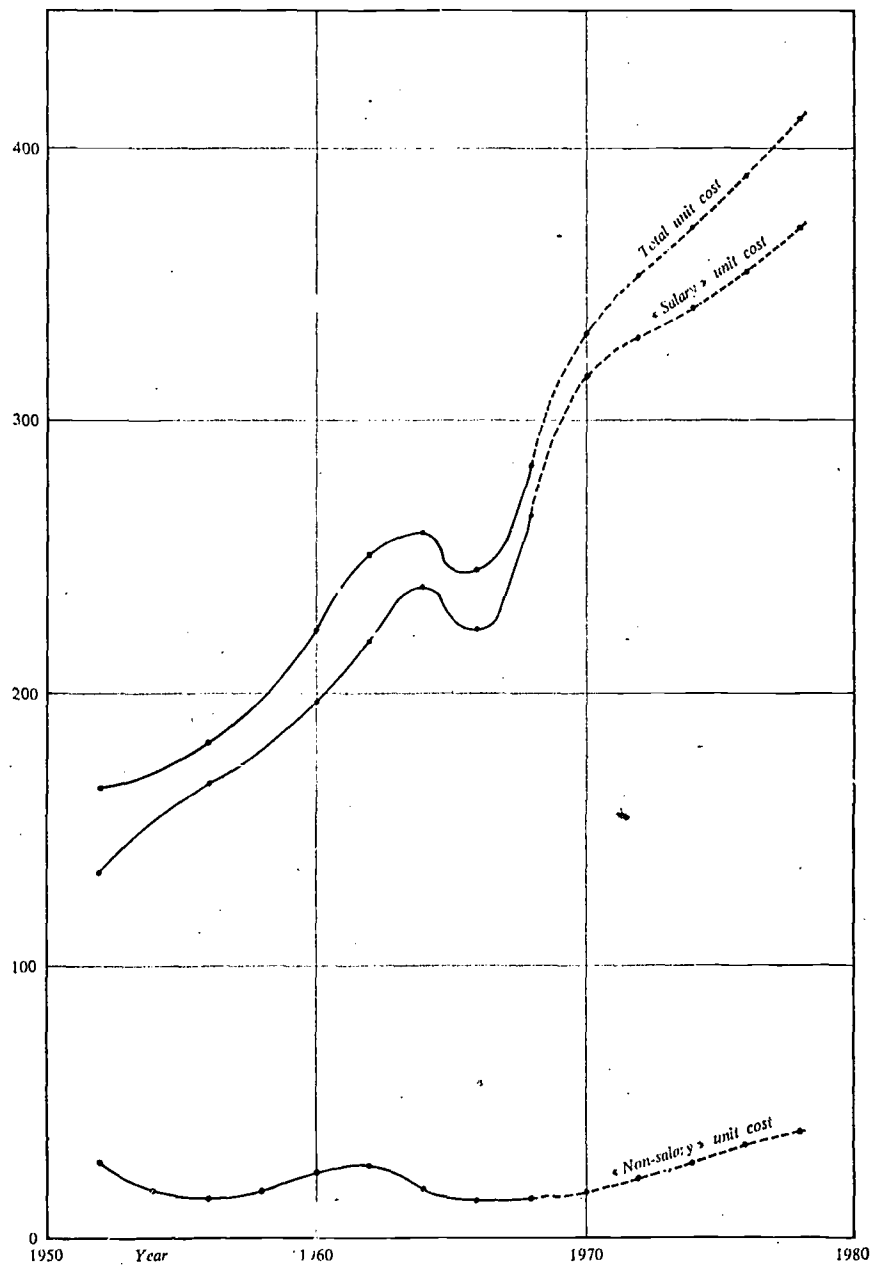


FIGURE 2. General education: second-level costs per pupil-year (in rupees).

Educational cost analysis in action: case studies for planners

the non-salary component is quite small; it decreases during the period 1952 to 1956, increases slightly from 1956 to 1960, decreases from 1960 to 1964 and remains steady from 1964 to 1968.

TABLE 5. Recurrent expenditure by purpose first- and second-level general education (in thousands of rupees)

Year	Teacher and non-teacher salary	Administration	Facilities & services	Teacher education	Pupil welfare	Total
1960	110 967	6 550	9 612	10 365	12 815	150 309
1962	216 510	8 122	18 767	15 505	13 080	271 984
1964	258 680	8 592	11 925	15 943	12 913	308 053
1966	270 565	9 974	11 455	13 904	13 221	319 119
1968	289 438	15 914	7 891	15 538	11 695	340 482

TABLE 6. Cost per pupil-year, 1960-68 first- and second-level general education (in thousands of rupees)

Year	Level I grades 1-8	Level II grades 9-12
1960	98.7	227.0
1962	109.6	252.1
1964	111.6	256.7
1966	103.7	238.5
1968	120.6	277.4

TABLE 7. Percentage distribution of unit costs, 1960-68 first- and second-level general education

Year	Teacher and non-teacher salary	Administration	Facilities & services	Teacher education	Pupil welfare	Total
1960	80.4	2.8	7.0	4.4	5.3	100.0
1962	79.7	3.0	6.9	5.7	4.7	100.0
1964	84.2	2.8	3.8	5.3	3.8	100.0
1966	84.9	3.1	3.6	4.3	4.1	100.0
1968	85.0	4.7	2.3	4.6	3.4	100.0

SOURCE Tables 5, 6 and 7 extracted from bibliography (13).

It is assumed that the second-level unit cost is made up in very much the same way as average unit cost for both first and second level. (See table 7). This is not strictly the case, but in view of the fact that the non-salary component is so markedly lower than the salary unit cost the assumption does not alter the general pattern of variation that has been described.

The administration component (A Cpt.) of unit cost is a relatively small one. It remained more or less steady from 1960 to 1964 but between 1964 and 1968 it increased significantly. The changeover to total government management and

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financing occurred in 1960 but the administrative effects were felt some years later and in addition in 1966 a reorganization of the system took place which resulted in increased administrative costs.

The dominance of teacher and non-teacher salary unit cost (TNS Cpt.) is not, of course, unusual—education is a labour-intensive activity. The trend in Ceylon for the salary component to increase, in the main rapidly, while the non-salary component declined slowly, occasions little surprise.

In 1968, 94 per cent of total unit cost was essentially the salary component. This in itself may indicate a desirable feature, as educational qualitative improvement may be critically dependent on favourable pupil/staff ratios and on the recruitment of highly qualified staff. And in so far as curriculum reconstruction, in-service teacher education and action research for improvement of school practices are included within teacher education, and therefore within the salary component (as it involves chiefly salary), the heavy weighting of the salary component may be an index of quality within the educational system.

However, it is clear that the extremely high proportion assumed by the salary component in 1968 was not primarily due to increases arising out of qualitative improvement programmes. It would appear from a study of the teacher salary constitution itself that the main increase was the result of an increase in the direct salary and related costs of teachers. Table 8 supports this view

TABLE 8. Unit cost and sub-unit costs first- and second-level general education 1960-68

Year	Teacher/ non-teacher salary	Administra- tion	Facilities & services	Teacher education	Pupil welfare	Total
1960	89.8	3.1	7.8	5.0	6.0	111.7
1962	100.7	3.8	8.7	7.2	6.0	126.4
1964	111.0	3.7	5.0	7.0	5.0	131.7
1966	106.6	3.9	4.5	5.4	5.2	125.6
1968	120.3	6.6	3.3	6.5	4.9	141.6

SOURCE Extracted from bibliography (13).

The low values of the general non-salary component in Ceylon certainly need to be looked at further. In particular the very low contribution of the facilities and services component (less than 2 per cent of total unit cost) is a matter which requires careful and critical examination. It reflects a situation where teachers are hired but are not in fact provided with the facilities necessary for effective teaching.

In this context, it is relevant to examine the trend lines for the same period. Detailed analysis of expenditure of some of the components is not readily available in view of the fact that some of them appear in the budget as 'items' and not as 'sub-heads'. Hence such an examination needs to be pursued in terms of the allocations in the budget under these various items. Two such items are examined.

The first of these relates to routine materials essential for teaching, such as chalk, stationery, etc., and allocations to these items are plotted for the period 1961 to 1969 (figure 3). It will be observed that the drop in the maintenance and

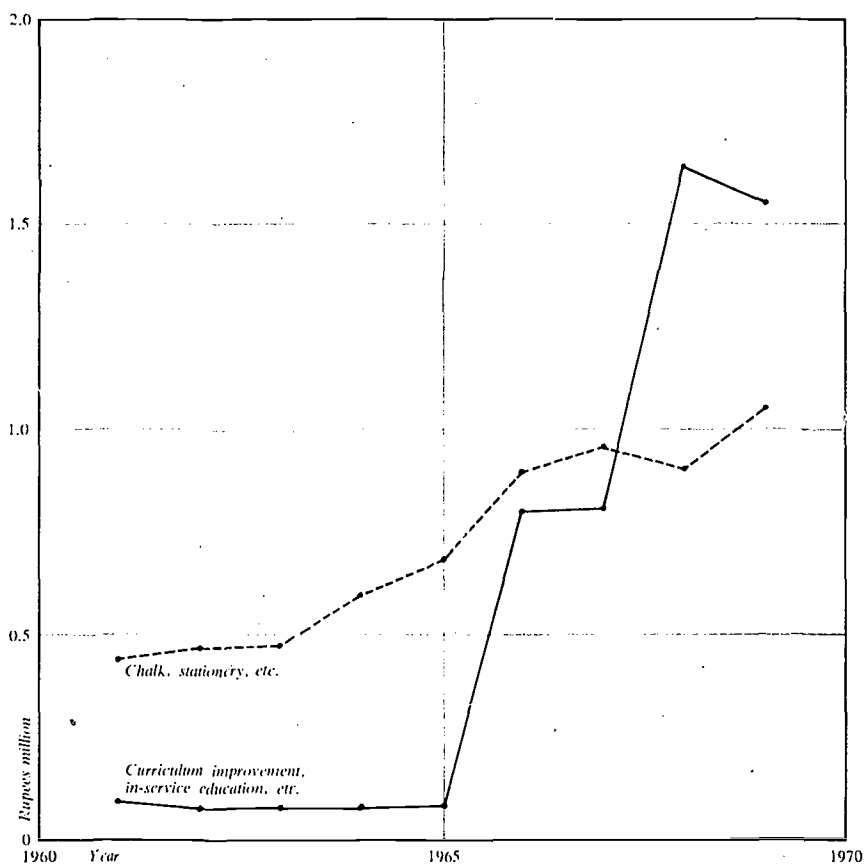


FIGURE 3. First- and second-level general education: allocations, 1960-69.

facilities percentage contribution to unit costs is not necessarily linked with an absolute drop in the allocation to this item. The graph indicates a definite increased absolute allocation for the period 1961 to 1968 but it is the proportionate contribution that is significant.

The other is a sub-component which occurs in the salary component of the unit cost: curriculum improvement and in-service education. This, too, cannot be examined for the entire period in terms of expenditure, but can be examined in terms of allocation to the item. Here, a very dramatic change occurs in 1965 and in 1967. Nevertheless, it is important to recognize that the absolute amounts are such that the increase in unit cost on account of this is less than one unit. It is clear, therefore, that the large proportion assumed by the salary component in 1968 is not primarily due to a dramatic increase in such quality improvement programmes as curriculum improvement and in-service education; had this been the case the high weightage might have been a very desirable feature. Rather,

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it would appear from a study of the teacher salary contribution itself that the increase is mainly due to the direct salary and related costs of teachers and not to 'non -teacher' increases. In part these comments are supported by table 8.

The Asian model of educational development appears to recommend that the teachers' salary component of group C countries, (to which Ceylon belongs), should be held at around 75 per cent in 1980, while at the same time the pupil/teacher ratio should be kept constant at 30:1. This is considered necessary to preserve a balance between salary and non-salary expenditure in Asian countries.

In exercises for the projection of unit costs and in the general planning of the development of the educational system in Ceylon, it is tacitly assumed that this point of balance is a valid one to seek. But maintaining a state of balance does not necessarily mean efficiency. Teachers might be doing work which other, less qualified, personnel could be doing (e.g. supervision of meals). Teachers' salaries depend also on the strength and militancy of teachers' unions, and it may be dangerous to assume balance or lack of it without analysis of internal criteria.

On this basis, none the less, pending a more detailed systematic analysis, the Ceylonese educational system may be said to be out of balance and hence may be in need of adjustment towards a preferable point of balance, as indicated in the Asian model.

III. Cost analysis and the design of annual budgets, short-term plans and perspectives

The need for systematic planning for the achievement of socio-economic development has been recognized for a long time in Ceylon (35). Cost analysis has been used in the design of short-term educational plans for the period 1966 to 1970 and for the design of 'perspectives' for the development of second-level education for the period 1968 to 1977 (11 and 13). It is also used in the design of the annual budget, which is essentially a one-year plan and programme.

In September 1964 the Prime minister set up 'A planning committee on manpower and education' as a result of which the Ministry of planning and economic affairs published a report (12) indicating a short-term development perspective extending from 1966 to 1970. Subsequently, the Ministry produced a document which looked forward to 1977 (13). This was discussed within the ministry and has been the basis for a series of discussions at executive level. It may form a basis for policy decisions for second-level general education. In addition to these studies, perspectives and short-term plans are being developed in the field of technical education and in higher education.

First- and second-level general education programmes in Ceylon are centrally controlled and in terms of current expenditure involve a very high resource

allocation, which has to be carefully considered and related to the general problems of resource allocations and priorities. And in the context of shortages of middle-grade and high-level skilled manpower, allocations to second-level general education have to be seen in terms of manpower policy; in particular the inputs to vocational educational institutes need to be provided for.¹

In working out perspectives for a large system involving thousands of schools, millions of pupils, and hundreds of millions of rupees, several techniques can be used for tracing the paths of development available for such a system over a decade. Ultimately, delineation of the path of development may require detailed analysis of the distribution of the service in terms of regions and sub-regions, and perhaps at a later point relating to individual schools. Yet the initial stage of such an analysis involves a projection of the system as a whole, and the development of recurrent cost projections corresponding to the pace and type of development envisaged.

For the moment, with severe limitations of staff with requisite skills, the only exercises which have been carried out relate to macro-projections for the entire system over a selected period, on the basis of selected stated sets of assumptions concerning the development of the system as a whole. These assumptions have been patterned, in part, by a preliminary study of the system in the recent past; in part, on the basis of intuitive decisions as to the preferred path of development in the future; and, in part, on the basis of extrapolation of some guidelines used and found effective in other national systems, and conceptually generalized in the professional literature of educational planning (14 and 36).

The present study, as has been remarked earlier, is an integrated presentation of management decision-making within the ministry. The technical documents available have often been prepared to meet the specific needs of a decision-making situation and do not contain rationale or assumptions explicitly stated. Sometimes these have been tacitly assumed; on other occasions they have been explicitly stated, but the records are diffused and unco-ordinated. Transfer of experience from other systems has also often been achieved on the basis of intuition and specific documentation is not quoted. Inevitably this study must necessarily reflect these inadequacies from a research standpoint. In any case, the study relates to unit cost, and major diversions from the limited theme to explain principles that have guided educational planning in Ceylon are not possible in terms of the time and space available. These aspects must await more detailed study.

Another feature of short-term planning and designing of perspectives which is significant for developing countries is related to the mobilization of external resources. The comments made in the preceding sections have essentially been concerned with internal resource allocations. In general, in the context of the enhanced activities of agencies such as Unesco and other multilateral and bilateral agencies, Ceylon as a developing country is actively participating in such co-

1. Unit cost per graduate, and projections of graduate rates from each level, would probably also have been useful information to help decision-making with reference to educational programmes orientated towards the manpower needs of the country (IIEP).

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operative programmes of development, which mobilize corporate resources available regionally and elsewhere. In particular this participation has been significant with Unesco, with Unicef, with the United Nations Special Fund and with the Colombo Plan and related multilateral agencies. This does not imply that participation in bilateral development work has been insignificant. It has contributed to development in many ways, including education. Initiation and conduct of the discussion and planning of operations for co-operative development work demand costed short- and long-term perspectives from which specific projects and programmes can be isolated, identified, amplified and developed for multilateral and bilateral assistance.

As a Member State of Unesco, Ceylon has participated in, and accepted in principle, such broad patterns of development as are outlined in the draft Asian model of educational development (30). The short-term plans and perspectives which have been evolved may be viewed as logical applications in the national context of these patterns of international co-operation.

A. The use of unit cost analysis in the costing of short-term plans and perspectives

Following the report of the Planning committee on education, health, housing and manpower published in 1967, (13) the Ministry of education, presented an 'over-all plan' (11) to the Committee on education for the years 1966 to 1970 with related cost estimates, both recurrent and capital. This report was submitted in November 1965.¹

The first stage of the design of this over-all plan was the projection of enrolments over the plan period. The mode of projection of pupil enrolments for the period 1966 to 1971 is reported in appendix A of the main report (13), with a summary of the enrolment projections, which is reproduced here as table 9. The projections were considered in terms of first- and second-level general education. Each level was costed, using unit costs worked out in a preliminary research study carried out within the ministry (7). A summary indicating the unit costs over the plan period and the anticipated recurrent costs for first and second level will be found in tables 10 and 11.

1. First-level education

In the study the question was raised as to whether it would be feasible, by 1970, to raise the participation rates of first-level general education to approximately 90 per cent of the corresponding age-group in the country. To resolve this the pupil population projections were worked out on the basis of appropriate alternative sets of assumptions.

1. The document is available as a technical working paper on first- and second-level general education within the ministry.

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This subsidiary projection is shown in table 12. To test its feasibility it was necessary to consider, in addition to the practical problems of increasing participation, the possibility of getting appropriate recurrent resources for providing the services without significant loss in terms of adequacy and quality. With

TABLE 9. Projected enrolment for first- and second-level general education, 1966-71 (thousands)

Grade	1965	1966	1967	1968	1969	1970	1971
1	406	425	446	470	494	520	546
2	371 + 345	390	408	429	452	475	500
3	294	343 + 319	361	377	396	420	441
4	235	257	300 + 279	315	330	346	369
5	209	205	224	262 + 243	275	288	302
Sub Total 1-5	1 860	1 939	2 018	2 096	1 947	2 049	2 158
6	185	182	179	196	229 + 213	240	252
7	159	162	160	157	171	200 + 186	210
8	141	146	149	147	145	158	184 + 171
Sub Total 6-8	485	490	488	500	758	784	817
Sub Total 1-8	2 345	2 429	2 506	2 596	2 705	2 833	2 975
9	132	137	141	144	142	141	153
10	181	212	220	228	232	229	226
Sub Total 9-10	313	349	361	372	374	370	379
11	26	25	29	30	31	32	32
12	20	22	22	26	27	27	28
Sub Total 11-12	46	47	51	56	58	59	60
Sub Total 9-12	359	396	412	428	432	429	439
GRAND TOTAL	2 704	2 825	2 918	3 024	3 137	3 262	3 414

SOURCE Extracted from bibliography (12).

TABLE 10. Unit cost for first and second level, 1965-71

	1965	1966	1967	1968	1969	1970	1971
<i>Cost per pupil (rupees)</i>							
Average for all pupils	126.8	129.2	131.6	134.0	136.3	138.7	141.1
Level I	108.1	109.2	111.1	111.3	115.9	118.4	120.8
Level II	248.6	251.1	255.5	255.9	266.6	272.3	277.8

SOURCE Extracted from bibliography (7).

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this end in view the capital costs as well as the recurrent costs of the new projections were worked out (table 13). Here again the unit costs evolved in the *Working paper* were applied. It is worth noting that this earlier study indicated clearly that even if legislative and other machinery enabled the new participation to be achieved, the possibility of getting resource allocations for the recurrent and capital costs would have been remote indeed, especially in view of the fact that first-level general education is not directly linked to critical manpower shortages.

The recurrent cost for first- and second-level general education for the enhanced participation rate is approximately 7 per cent of anticipated GNP for 1971, a higher allocation than has been achieved in the Asian region (34). The figure, it was recognized, was such that recurrent resource allocations of this order of magnitude could not be anticipated for this sub-sector of education. Even if the

TABLE 11. Recurrent costs for first and second level 1965-71 (in thousands of rupees)

Years	1965	1966	1967	1968	1969	1970	1971
<i>Level I</i>							
Enrolment	2 345	2 429	2 506	2 696	2 705	2 833	2 975
Cost	253 495	265 247	278 417	288 935	313 510	335 427	359 380
<i>Level II</i>							
Enrolment	359	396	412	328	432	429	439
Cost	89 372	99 743	105 591	116 281	114 063	117 012	122 335
<i>Total</i>							
Enrolment	2 704	2 825	2 918	3 024	3 137	3 262	3 414
Cost	342 867	364 990	384 008	405 216	427 573	452 439	481 715

SOURCE Extracted from bibliography (7).

TABLE 12. Projected recurrent expenditure, for first- and second-level general education¹

	1955	1966	1967	1968	1969	1970	1971
<i>Basic</i>							
Enrolment	2 521	2 764	2 992	3 209	3 425	3 637	3 844
Cost	272 520	301 920	332 411	357 162	396 958	430 621	464 355
<i>Post-basic</i>							
Enrolment	365	404	455	535	617	692	776
Cost	90 739	101 353	116 253	136 907	164 431	188 432	215 572
<i>Total</i>							
Enrolment	2 886	3 168	3 447	3 744	4 042	4 329	4 620
Cost	363 259	403 273	448 664	494 069	561 389	619 053	679 927

- NOTES
1. On the assumption that the retention at grade 8 would be 90 per cent of grade 1 enrolment.
 2. Enrolment in thousands, cost in thousands of rupees.
 3. Total cost was arrived at by multiplying the projected unit cost by the total projected enrolment.
 4. Cost of basic education (level I) was calculated on the ratio of 1 : 2.3 using the formula $X_{01} + 2.3X_{02} = C$, where X = cost per pupil-year in basic schools and therefore $2.3X =$ the cost per pupil-year in post-basic (level II) schools; n^1 = the number of pupils in post-basic schools. The cost of post basic was derived by deducting the cost of basic education from the total. This was done in order to avoid having to work to three decimal places to get exact figures.

SOURCE Extracted from ministry working papers.

TABLE 13. Capital expenditure on classrooms and equipment for first- and second-level general education

	Additional classrooms required ¹						
	1965	1966	1967	1968	1969	1970	1971
Grade 1 to 8	6 075	6 075	5 700	5 450	5 375	5 300	5 175
Grade 9 and 10	500	900	1 180	1 840	1 800	1 550	1 830
Grade 11 and 12	—	100	133	200	267	400	367
Total							
No. of classrooms	6 575	7 075	7 013	7 490	7 522	7 250	7 372
Cost of classrooms ²							
Grade 1-8	42 525	49 525	49 091	52 430	52 654	50 750	51 604
Grade 9-12	3 500	7 000	9 191	14 280	15 029	13 650	15 379
Total	46 025	56 525	58 282	66 710	67 683	64 400	66 983

1. On the assumption that the retention at grade 8 would be 90 per cent of grade 1 enrolment.

2. In thousands of rupees.

NOTE Up to the 8th. standard classroom requirements have been calculated at forty pupils to a classroom and in the GCE (Ordinary level) and above at the rate of thirty pupils to a classroom. This calculation does not take into account any backlog. The cost of a classroom is taken as Rs 5,500 and cost of furniture for a classroom as Rs. 1,500.

SOURCE Extracted from ministry working papers.

allocation were possible, another problem that might limit such development was the capital costs involved. And even if finances were allocated, it was not at all certain that the building potential of the country could accommodate itself to the increased rate of activity. These and other considerations prompted a scaling-down of the rate of increase of participation in first-level education.

These two exercises carried out for the ministry's Planning unit, as well as for a national planning committee, are examples of the use of unit costs for the consideration of two alternative quantitative paths of growth for an educational system—in this instance first level.

In the present study no critical discussion will be presented to validate the matrix of assumptions on which these enrolment projections *per se* rested. It is perhaps significant to note that the projected unit costs in this study were derived by an adaptation of a line of argument originally embodied in a projection of the Ceylonese educational system made in the early sixties by a visiting Unesco team concerned with educational planning (37).

2. Second-level education

During the latter part of 1968 the need for 'a perspective for the development of second-level general education' extending to approximately 1977 was recognized. Such a study could provide guidelines for the evolution of plans and programmes for extension, structural changes, and qualitative improvement within general education; more particularly with special reference to curriculum areas such as science, mathematics, first language, second language and social studies. The need

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for this second-level general education perspective arose also because a revised base was required for third-level plans and programmes for about five years.

Therefore, the Ministry of education in February 1969 prepared a document on perspectives for the development of second-level general education (13). This document deals with perspectives in relation to participation patterns and provides estimates of recurrent and capital costs linked to the enrolment projections worked out in it. It is also illustrative of the systematic use of cost analysis, and in particular unit costs, in the development of the financial perspectives. An attempt will be made to outline this use of cost analysis.

It is assumed that it is not necessary to outline here the detailed arguments used in deciding upon participation patterns for second-level education. Nevertheless, it is significant to note that as a pre-requisite to the development of a perspective for second-level education it was necessary to work out the enrolment projections of first-level general education, using suitable matrices of assumptions. The first- and second-level enrolments are given in tables 14 and 15, with some related supporting material from the Ministry of education document given in the appendix, tables 1-5.

On the basis of the enrolment projection for first level, the diversified enrolment and participation patterns in second-level general education have been evolved for the plan period. This also entailed the use of a series of assumptions. Some of these were based on experience within the island; others, such as participation rates in science-mathematics programmes for the age-groups 14+ and 16+, are extrapolations of experiences elsewhere in the world.

The enrolment patterns for second-level general education are given in table 16.

The problem that remained to be resolved after calculating the enrolment and the participation characteristics of the second-level system was the costing of the system. There were several problems concerning the financing of recurrent costs.

During 1968, there had been considerable agitation for salary revision in the government sector. Furthermore, during the same period a decision had been made to pay an 'interim allowance' to supplement wages (see table 18, p. 101, 1968/69). Towards the end of the year, the agitation gathered momentum and strike action calling for salary revision was in evidence. This ferment in the socio-economic sphere meant that analysis of past unit costs and simple projections of unit costs such as had been done (37) by the Unesco Regional Advisory Team in the early sixties were insufficient.

In this context, the following course was adopted. The unit costs and sub-unit costs for the financial year 1967/68 were worked out. These are given in table 8, p. 89. The percentage contributions to the total unit cost of the various sub-unit costs are given in table 7, p. 88. These unit costs and sub-unit costs were used as a base for projections.

When making projections a preliminary adjustment of the base year unit cost, i.e. 1967/68, was made by the transformation of the interim allowance into a salary sub-unit cost and by the subsequent addition of this sub-unit. Thereafter the salary unit cost was adjusted according to assumptions made as to likely future governmental policy. This postulated increase has been converted into

TABLE 14. Enrolment projections 1965-77 first- and second-level general education (thousands)

Enrolment	1965 ¹	1966 ¹	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Grades 1 to 5	1 403.2	1 696.3	1 721.6	1 758.6	1 630.0	1 652.0	1 642.5	1 659.4	1 672.7	1 682.0	1 695.3	1 711.6	1 731.9
Grades 6 and 7	341.1	347.8	341.7	359.0	542.4	556.9	470.7	475.2	458.4	468.5	476.1	481.3	486.7
Sub-total	1 744.3	2 044.1	2 063.3	2 117.6	2 172.4	2 208.9	2 113.2	2 134.6	2 130.4	2 151.2	2 171.4	2 192.9	2 218.6
Grade 8	139.0	140.8	136.8	137.7	137.7	153.1	284.3	182.4	240.3	198.1	198.4	204.6	208.8
Grade 9	119.3	118.1	121.1	118.2	119.5	120.1	134.1	250.2	161.0	186.8	171.4	177.8	183.6
Grade 10	174.9	184.1	188.9	190.0	184.5	185.9	185.9	206.7	383.8	245.9	283.9	259.3	267.8
Sub-total 9-10	294.2	302.2	310.0	308.2	304.0	306.0	320.0	456.9	544.8	432.7	455.3	437.1	451.4
Sub-total 8-10	433.2	443.0	446.8	445.9	441.7	459.1	604.3	639.3	785.1	624.8	653.7	641.1	660.2
Grade 11	20.1	20.0	21.3	25.3	25.6	24.9	25.1	25.1	27.9	51.7	33.1	38.3	31.2
Grade 12	26.3	24.7	26.2	25.8	30.6	31.0	30.1	30.3	30.3	33.7	62.5	40.1	46.2
Sub-total 11-12	46.4	44.7	47.5	51.1	56.2	55.9	55.2	55.4	58.2	85.4	95.6	78.4	77.4
Sub-total 9-12	340.6	346.9	357.5	359.3	360.2	361.9	375.2	512.3	603.0	518.1	550.9	515.5	528.8
Sub-total 8-12	479.6	487.7	494.3	497.0	497.9	515.0	659.5	694.2	813.3	710.2	749.3	719.5	737.6
GRAND TOTAL	2 223.9	2 531.8	2 557.6	2 614.6	2 670.3	2 723.9	2 772.7	2 829.3	2 973.7	2 867.4	2 920.7	2 912.4	2 956.2

1. Data from the school census.

SOURCE Extracted from bibliography (13).

TABLE 15. Smoothened enrolment projections, first- and second-level general education 1968-77 (69-1), in thousands

Grades	1968 ¹	1969	1970	1971	1972	1973	1974	1975	1976	1977
Grades 1-7	1 940	1 966	1 992	2 018	2 044	2 070	2 096	2 122	2 148	2 174
Grades 1-8	2 083	2 116	2 149	2 182	2 215	2 248	2 281	2 314	2 347	2 379
Grade 8	143	150	157	164	171	178	185	192	199	205
Grades 8-12	464	490	516	542	568	595	622	649	676	702
Grades 9-12	321	340	359	378	398	418	438	458	478	497

1. Actual figures. SOURCE Extracted from bibliography (13).

TABLE 16. Enrolment projections, second-level general education, 1968-77, in thousands

Grade	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Grade 9 Arts	89.4	88.2	87.2	96.1	176.4	111.8	128.2	116.0	118.6	120.8
Science	22.5	24.1	25.5	50.0	58.8	39.3	47.4	45.1	48.5	51.8
Grade 10 Arts	137.4	136.1	135.2	131.1	145.7	266.9	168.7	192.2	173.0	176.2
Science	35.7	37.3	39.5	41.6	48.6	93.8	62.4	74.7	70.7	75.5
Grade 11 Arts	13.5	17.3	16.7	16.7	16.6	18.3	33.8	21.5	24.7	20.1
Science	4.9	6.8	6.7	6.9	7.0	7.9	14.8	9.6	11.3	9.2
Grade 12 Arts	16.8	20.7	20.8	20.7	20.1	19.5	22.0	40.6	25.8	29.7
Science	6.4	8.1	8.3	8.4	8.4	9.0	9.7	18.2	11.9	13.7

another salary sub-unit cost and added to the adjusted base year unit cost. In this way the base year unit cost was adjusted twice for increases that were anticipated.

In selecting the assumptions for the projections of salary unit cost it has been assumed that because of the 1968/69 major salary revision decisions, large-scale comprehensive salary revision processes will not operate in the first three years of the plan period. At the same time, it is postulated that significant increases arising from one factor or another may operate in the second part of the plan period. The above arguments in part account for the 1 per cent increase in salaries for the first three years and the 2 per cent thereafter.

Even during the first three years an increase in the salary unit costs is postulated on account of the recruitment of more qualified teachers and of a somewhat relatively young teacher cadre obtaining substantial increments without compensatory 'retirement factors'. No data are available in Ceylon as to the age-structure of the teaching force. Systematic analytical data of teaching staff by qualifications are also not readily available. In the absence of these data the relatively arbitrary assumptions cannot be further validated except by actual comparison with performance. It is anticipated that future research will resolve these problems.

The pattern of secondary education itself is expected to alter significantly during the plan period. In particular the percentage of students undertaking science education and vocational programmes is expected to be much larger towards the end of the period. In the original exercises the increased unit cost which are contingent on such a change in the pattern of secondary education were not taken note of; this may be a definite weakness in the cost projections. It is anticipated that the exercise may be revised to take note of this factor.

An important feature which has already been commented on is the *abnormally low* contribution of the non-salary component to the the total unit cost (28 and 38). The contribution made by the non-salary component to the unit costs is shown in table 8, page 89. It is argued that the non-salary component and its contribution to the total unit costs should be increased over the plan period (30, 36 and 37). On this basis non-salary unit costs have been revised during the plan period at approximately 10 per cent compound. This figure has been arbitrarily selected after trial-and-error calculations to bring the non-salary proportion to a point of 'balance' as indicated in the draft Asian model and yet to keep the increment in unit cost within reasonable bounds. Different ways of using the larger non-salary allocation have been considered but no specific data will be presented on this aspect.

Projected total unit costs, broken down by salary and non-salary, are given in table 18.

The recurrent costs for second-level general education have been calculated by taking into consideration the enrolment projections in table 14 and the respective unit costs in table 18. The recurrent costs thus calculated have already been given in table 4.

In the above paragraphs an outline has been given of the use of unit costs in calculating over-all recurrent cost estimates, in the context of a particular situation.

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The interesting feature which is worthy of note is the special value of the sub-unit costs when situations such as those which have been indicated arise. In fact, it may be argued that but for the availability of analysed sub-unit costs data, it might have been very difficult indeed to cope with the several factors. In the main, three such factors have been taken note of. It is likely that some valid projections might have been made of the gross expenditure components. But it will be clear

TABLE 17. Enrolment ratios, 1965 and 1977

	1965			1977		
	Popu- lation (thousands)	Enrol- ments (thousands)	Enrol- ment Ratio (percentage)	Popu- lation (thousands)	Enrol- ments (thousands)	Enrol- ment Ratio (percentage)
Grade 1	315.0	380.2	120.7	347.3	416.9	120.0
Grade 2	317.0	299.9	94.6	345.2	382.9	110.9
Grade 3	299.0	266.7	89.2	341.5	346.6	101.5
Grade 4	291.3	241.6	82.9	338.6	311.5	92.0
Grade 5	284.4	214.8	75.5	336.5	274.0	81.4
Grade 6	278.0	185.1	66.6	334.0	257.6	77.1
Grade 7	271.2	156.0	57.5	332.5	229.1	68.9
Grade 8	265.0	139.0	52.5	331.0	208.8	63.1
TOTAL	2320.9	1883.3	80.9	2706.6	2427.4	89.5

SOURCE Extracted from bibliography (13).

TABLE 18. Projected salary and non-salary unit costs, first- and second-level, 1969-78

Year	Primary Assuming Rs 30 interim payment		Secondary Assuming Rs 30 interim payment	
	Salary unit cost	Non-salary unit cost	Salary unit cost	Non-salary unit cost
1967/68	113.7 ¹	6.9 ¹	261.5 ¹	15.9 ¹
1968/69	137.2	7.6	315.5	17.5
1969/70	138.6	8.3	318.7	19.5
1970/71	140.0	9.1	321.8	21.2
1971/72	141.4	10.0	325.0	23.3
1972/73	144.2	11.0	331.5	25.6
1973/74	147.1	12.1	338.2	28.2
1974/75	150.0	13.3	344.9	31.0
1975/76	153.0	14.6	351.8	34.1
1976/77	156.1	16.1	358.8	37.5
1977/78	159.2	17.7	366.0	41.3

1. Interim allowances not included.

NOTE (a) Salary component should be increased by 1 per cent annually over the first three years (1969/70—1971/72) and by 2 per cent annually over the rest of the period.
(b) Non-salary component should be increased by 10 per cent annually over the whole projection period.
(c) The basic salary of teachers and other employees is assumed to be increased by Rs. 30 within the current financial year.

SOURCE Extracted from bibliography (13).

that the use of unit and sub-unit costs provides additional insight and flexibility.

In the *Perspective for the development of second-level general education* (13), in addition to the use of the unit costs in working out over-all recurrent costs estimates, sub-unit costs, at a relatively high level of resolution, have been used in drawing up a perspective relating to qualitative improvement.

This has been done by actually estimating what is, in effect, a sub-unit cost for qualitative improvement, via curriculum construction and in-service teacher education. The current commitment to qualitative improvement of this type has been assessed, and this has been converted into a percentage of the total recurrent costs for second level. This is given in the 1968/69 column, in table 19. It will be seen that this percentage is approximately 0.7 per cent of the total recurrent second-level costs in 1968. In designing perspectives for qualitative improvement in this regard, at this level, it has been postulated that the relative effort should be increased three-fold over the plan period. This means that in the last year of the plan period, approximately 2 per cent of the recurrent cost will be allocated to qualitative improvement of this nature.

A summary showing the costs, recurrent and capital, is given in table 20.

This perspective will probably be used as a base for the design of the budgets in the years immediately ahead as far as second-level general education is concerned. In addition to such use within the country for internal resource allocations it is likely that these cost estimates will provide the basis for discussion of multilateral and bilateral co-operative education development programmes at the second-level in the field of science and mathematics, social studies and languages.

B. Implications of cost analysis in the context of designing annual budgets, short-term plans and perspectives

The exercises relating to the drawing-up of short-term plans for 1966-71, as well as to estimating costs for the period 1968-77, indicate clearly that over-all costs in themselves are *not* an adequate basis for systematic projection of costs. It is necessary to resolve expenditures at least by recurrent and capital costs, and this breakdown itself is inadequate.

When the situation is not in 'balance' and when the system is reacting to pressures of one type and another, it is necessary to sub-divide recurrent costs by purposes.

In this study a specific situation has been outlined wherein the base year unit cost by purpose (salary) had to be adjusted prior to projection. The non-salary component has been projected using different assumptions to achieve a better 'balance' of components of costs by the end of the plan period. It is clear that planning at this level of resolution is feasible only if cost analysis has differentiated between unit costs and sub-unit costs by principal purposes.

When such analyses are available, it is possible to isolate factors affecting each purpose over the plan period, and postulate anticipated changes of pattern. The achievement of 'balance' within the educational system entails taking many different factors into account. The educational postulates and design may be

TABLE 19. Anticipated recurrent resource allocations for second-level general education quality improvement¹

	1968/69 ²	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78
1. Allocation for science/maths— (Rs. millions ⁶)	0.80 ⁵	0.91	1.02	1.13	1.35	1.57	1.79	2.01	2.23	2.40
2. Allocation for second language (English) (Rs. millions ⁶)	0.20	0.27	0.34	0.40	0.53	0.66	0.79	0.92	0.95	1.20
3. Allocations for first language, social studies and other curriculum areas (Rs. millions)	0.20	0.27	0.34	0.40	0.53	0.66	0.79	0.92	0.95	1.20
4. Total direct allocation for quality improvement (curriculum develop- ment, in-service teacher education, evaluation reform etc.) (Rs. millions)	1.20 ⁴	1.45	1.70	1.93	2.41	2.89	3.37	3.85	4.13	4.80
Total at 4 above as a percentage of the projected total recurrent costs of secondary general education	0.7 ³	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0	2.2

1. Direct costs of quality improvement appear in vote 4 essentially under the curriculum development unit in sub-head 1, 2, 3 and under sub-head 33 (68/69 estimates).

2. The figures for 68/69 are approximate figures giving the order of magnitude. The sub-allocations 1, 2 and 3 are also approximate.

3. This is a measure of the relative quality improvement effort. It is being increased threefold over the plan period.

4. The absolute effort is being increased four-fold.

5. The share of science/mathematics is high in 68/69. The share is progressively adjusted downward over the plan period but the absolute effort will increase threefold.

6. 1968 prices.

SOURCE Extracted from bibliography (13).

TABLE 20. Perspectives for the development of second-level general education—summary of recurrent and capital costs, 1968-77 (in millions of rupees)

	1968/69	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77
<i>Recurrent costs</i>									
Teacher & non-teacher salary (but excluding direct salary of quality improvement)	146.10	150.74	157.19	204.83	218.25	270.19	233.55	248.96	243.94
Facilities services, pupil welfare, maintenance, etc., (but excluding direct costs of quality improvement)	7.20	8.01	9.21	13.34	15.34	20.82	19.08	21.99	23.43
Direct costs of curriculum development and quality improvement	1.20	1.45	1.70	1.93	2.41	2.89	3.37	3.85	4.13
TOTAL RECURRENT COSTS	154.50	160.20	168.10	220.10	236.00	293.90	256.00	274.80	271.50
<i>Capital Costs</i>									
Capital costs for extra classrooms for increased enrolment	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Capital costs for curriculum diversification (science labs., social studies rooms, etc.)	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Direct capital costs of curriculum development units, extension centres for in-service teacher education and related activities of quality improvement	1.2	2.7	1.3	1.3	1.3	1.85	1.85	1.85	1.85
Capital costs 'back-log and replacement of stock'	3.0 ¹	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
TOTAL CAPITAL COSTS	10.9	12.4	11.0	11.0	11.0	11.55	11.55	11.55	11.55
1. Approximate costs of replacing 3 per cent of stock.									
SOURCE Extracted from bibliography (13).									

usefully transformed into cost perspectives such as here illustrated for salary and non-salary balance. It is also illustrated in the perspective drawn up for qualitative improvement.

IV. Concluding comments

One important function of management is that of assimilating critically lessons of the past and applying them with judgement in relation to the future (2, 39 and 40). This study has attempted to outline how this has been done in a limited way in a particular educational system in the context of cost analysis.

One question which arises is whether the current structure of the budget and modes of accounting are the most appropriate for managing a relatively rapidly changing system such as the one under consideration (3).

Another question that this analysis has raised is how best to allocate resources within the educational system to the various purposes involved within it (6). A particular aspect of this issue is the balance between quantitative educational development and qualitative improvement in curriculum design and instruction. Should the increase in the recruitment of qualified teachers go hand-in-hand with a corresponding increase in the resources allocated for teaching equipment? If this is not done, can teachers function effectively within classroom situations and in schools? What are the criteria of 'balance' in this respect from a financial standpoint?¹

A. The necessity of changing the structure of the budget or supplementing it in selected ways

The budget has legislative sanction; it is an Act of parliament. Therefore, its structure in many ways is stipulated in formal terms at several levels. Furthermore the pattern of financial control and direction and accounting practices are deep-seated traditions.

It is not feasible, therefore, to suggest sweeping structural changes in the budget without detailed consideration. In this section it is not the intention to make a comprehensive analysis of the structure of the budget. Nevertheless, it is clear in the context of the study that the structure of the annual budget as it exists is not entirely adequate for management purposes.

1. There are other criteria besides financial ones, and the concept of 'balance' is a little strained here. A better-quality teacher (and consequently more highly paid) can presumably achieve more with the limited resources available. A better-trained teacher does not necessarily need more provision of resources for teaching and learning. He might even need less. (IIEP)

Firstly, the ambiguity in the separation of the major programmes for first-level and second-level general education is an important limitation. An analogous factor, not indicated in the study, but related, is the ambiguity that exists in relation to teacher education programmes at the second level. Similar lack of isolation exists for second-level vocational and technical programmes.

Ten years ago, the structure was even more ambiguous and lent itself even less to systematic cost analysis. The changes that have been observed over a decade are, in the main, in a direction such as to make the budget a more flexible instrument of management and more effective for purposes of both control and planning.

In particular, in structuring the budget, in addition to the isolation of first- and second-level expenditures, it is necessary to have a breakdown such that the salary and the non-salary components of expenditure are readily recognized. In addition, such factors as pupil welfare need to be shown in greater detail.

In spite of these limitations in the budgetary structure some useful cost-analytical results have been achieved in Ceylon. The availability of these data has undoubtedly made professional staff more sensitive to the need to take note of problems. Even the highest level of policy decision-makers, including the Minister of education himself, have remarked about the salary cost issue. Recruitment policies have been significantly modified in this context. Such an achievement in the face of acute political, sociological and economic pressure is clearly indicative of the potential value of objective systematic data.

The budget needs to be constructed in such a way that data can be quickly analysed. Where this has not been done supplementary information will be necessary.

It is also necessary for future work to consider some of the present major factors and powerful forces that bear on school systems, their management staff and on the pupils. For example, what must an educational manager be trained in? Obtaining rapid feed-back from the system is one essential task. An important component of such feed-back is financial cost data, appropriately analysed. Another mode of response involves the capacity to project or 'to lean over into the future'. Cost analysis, obtained with a little time-lag, could help in all these respects.

B. Relevance of the case study for other educational systems

It is important to stress that this study does not claim to isolate and specify the best techniques that are available and which can be used in the field of cost analysis. However, one value of the study lies in the fact that it is *not* a hypothetical or purely research study. It may have special significance in a wider field in view of the fact that the analysis was done in a developing country with acute scarcities of resources, including time. Perhaps the most important contribution of the study is in illustrating how cost analysis can be applied in a developing country.

The techniques of cost analysis adopted are, in the main, simple. One does not need to wait for a conceptually perfect and technically unambiguous sophisticated

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cost-benefit analysis or rate-of-return assessment to begin systematic financial management. Relatively simple procedures can yield useful guidelines—if only leading to the formulation of the problems.

The study deals with a national system. It is large enough to represent a situation where all of the significant factors operating on education are at play. Nevertheless, the country and the system are sufficiently small and the pattern of administration sufficiently integral and centrally controlled for the facts to be set out in a relatively simple manner. The Ceylonese situation has many elements of an 'experimental laboratory' situation. To this extent the cost analysis could have additional relevance, especially when it is further developed and analysed in the years ahead.

In general, the use of unit cost analysis specifically in the context of programming of an aspect of qualitative improvement is not often met with and its use in a developing country may, in fact, be quite unusual. Hence the use of sub-unit cost for the delineation of perspectives for qualitative improvement through curricular reconstruction and in-service teacher education may be especially useful and meaningful. This may be particularly relevant in the current phase of development in education throughout the world, with increasing emphasis being laid on curriculum improvement and qualitative up-grading. In this particular area of educational management there are difficult decisions to be made involving relatively limited resources, but which have a major impact on educational systems in terms of quality.

With the systematic analysis of the situation and the availability of more and more data—professionally gathered and analysed—the group dynamics of budgetary discussion are improved. In the past, such conferences have tended to be battlefields, but the atmosphere has changed to one of professional co-operation. The emerging attitudes towards budget design involve constructive discussion leading to consensus. The systematic accumulation of analysed data of performance and costs in detail and the availability of projected information—also analysed and costed—provide a very stimulating basis for professional management. In the Ceylonese situation this trend has been markedly evident. That this change can be achieved with relatively little effort using even rudimentary analysis of the situation is the lesson to be learnt from this study.

V. Commentary by IIEP

This case study is interesting not only for what it tells about cost analysis but also for the illuminating picture it gives of the myriad considerations that enter in, and the dynamic process that takes place, when serious-minded educational planners in a developing country endeavour to project the expansion and qualitative improvement of their school system, in the face of severe resource limits.

It is common knowledge that planners in developing countries, Ceylon included, labour under the heavy handicap of inadequate and imperfect basic data about their economy, population and society, and most of all about their educational system itself. It is refreshing, therefore, to encounter this case in which a group of planners, undaunted by these handicaps, somehow assembled an impressive array of data, filled various information gaps with ingenuity, and boldly went on to produce some useful estimates of the future. The methods and the results fell well short of the ideal, yet well beyond what many countries have so far been able to achieve.

The very breadth of the case, however, makes it frustrating to comment upon, because one is tempted to slight the promising issue of cost analysis in order to chase after a variety of other interesting issues—such as the use made (or not made) of demographic and manpower data in arriving at enrolment projections; the extent to which, and the reasons why, the Unesco 'Asian model' influenced the setting of educational targets in Ceylon; or the pros and cons of using 'intuitive' evidence, born of experience, as a supplement to or a substitute for 'hard' evidence. To avoid such temptation we shall limit ourselves here to two main topics bearing directly on cost analysis: the methods used in projecting unit costs, and the attempt made to express qualitative improvement in cost terms.

A. The treatment of unit costs

The central task in this case was the familiar one of 'costing' some enrolment projections that had been made for an over-all plan, in order to determine their financial implications and feasibility.

A common practice in such situations has been to assume that today's unit costs will remain substantially the same in the future, and thus to compute a crude average present cost per student (by dividing the official total enrolments into total educational expenditures for the most recent year), and then multiply the resulting 'unit cost' by projected enrolments for each future year to determine successive annual financial requirements.

Financial projections made by this quick and easy method, unfortunately, almost invariably prove to be very wide of the mark—inevitably on the low side—with the frequent result not simply of making the planners and the whole idea of educational planning look foolish, but of playing havoc with the national budget and the orderly development of education.

The Ceylonese planners did not fall into this trap. Wisely and candidly they anticipated a steady rise in unit costs—even if quality should stand still. In fact, they explicitly added a further cost increase for 'qualitative improvement'. If one were to fault them, therefore, it would certainly not be for their lack of realism, candour, or technical ingenuity; it would be perhaps for their occasional lack of sufficient explanation as to exactly how they arrived at their upward-trending cost estimates.

They began their costing exercise, quite logically, by trying to ascertain *present*

unit costs for primary and secondary education, and promptly collided with the disconcerting fact that the official accounts offered only an inseparable mix of first- and second-level costs—thereby giving a per-pupil average cost which was certainly too high for primary and too low for secondary. By a simple method they managed to overcome this obstacle. They arrived not only at separate estimates of total unit costs for first- and second-level, but at a breakdown of each into its major components. These provided the foundation for their subsequent projections of future unit costs.

It would have been even better, of course, if their data had permitted them also to make separate unit cost estimates for rural and urban schools, since there was reason to suspect substantial differences between the two which might have significantly affected their later financial conclusions. It would have been useful also, if possible, to make separate estimates of repeater and drop-out rates according to sex, grade and region of the country, since important variations here might also have influenced their later conclusions. We must assume, however, that they exploited their available data to the full limit that their professional conscience would allow.

The important conclusion to be highlighted at this point, which the authors themselves stress, is that traditional educational budgetary accounting systems fail to yield many essential types of data required for good cost analysis, sound educational planning and effective educational management. These budgets and accounts were originally designed, in practically all countries, to serve the purposes of appropriation committees and auditors, not to meet the needs of modern educational planning and management. Hence, as the authors suggest, they need drastic overhauling, or at least extensive supplementing with new information flows, differently presented.

From the historical unit cost figures the Ceylonese planners proceeded to make cost adjustments to allow for likely future developments. In principle, they should have made allowance for such important factors as (i) inflation, (ii) general teacher salary increases, (iii) 'built-in' cost increases inherent in the teacher salary structure, (iv) 'qualitative improvements' (or the reverse), (v) changes in efficiency, and (vi) different rates of expansion in subject fields or geographical areas having notably higher or lower than average unit costs. In fact, they clearly did take account of at least some of these factors, but it would have been illuminating to have more particulars.

It is worth commenting particularly on their projected increase in teacher salaries (by 1 per cent from 1969 to 1971 and by 2 per cent thereafter), since these constitute the lion's share of total recurrent costs and even a small error in estimating can have sizeable consequences. Evidently the reasoning behind these estimates was that since the teachers, through their unions, had recently won a rather sizeable general increase, they would be willing to rest for a while on modest annual increments, but the time would come when larger increases would be demanded. What is not clear, however, is whether the planners actually made a detailed study of the inescapable built-in cost increases for the future period in question that were already implicit in the prevailing teacher salary structure,

quite apart from any further general salary increases that might occur. This would have required not only looking at the salary structure itself—its provisions for automatic annual salary increases, retirement, age limits, salary differentials between different qualification levels, etc.—but also examining the age structure of the present distribution of teachers by qualification and salary levels, and the likely impact of the in-service training programme on teacher promotions in the period ahead. As a case study from Tanzania in this series demonstrates, it is vitally important in projecting future teacher costs to look carefully at these dynamic factors and not simply to rely upon historical averages, which may be very erroneous guides to the future.¹

Another point worth noting is that, in keeping with customary practice, the Ceylonese planners confined their estimates to 'cost-per-pupil-enrolled'. They made no estimate of 'cost-per-pupil-graduated'.² Customary practice in this respect leaves much to be desired, particularly in developing countries where a large portion of school resources are spent on pupils who never finish and on others who take more than the basic number of years to finish. Cost-per-pupil-enrolled, therefore, is a relatively meaningless figure both educationally and financially. It conceals in a statistical average a variety of important things going on within the educational system. Planners whose aim is to improve quality and to reduce the number of drop-outs and repeaters are therefore well advised to project not only the customary cost-per-student-enrolled, but to go further and project the cost per graduate. The very process of trying to make such an estimate is likely to bring more clearly into the open a number of important issues and opportunities for improvement.

B. Quality and cost

The Ceylonese planners did well to avoid also the old trap of assuming that rising costs per pupil *ipso facto* mean rising quality of education. But they also rejected the opposite notion—that quality can somehow be improved at no cost. In effect, they took the middle position (if we may be so bold as to try and read their minds) that unit costs were going to rise in all events, for reasons beyond the control of educational administrators, but if quality was *also* to rise, then some strategy must be found to earmark securely a certain portion of future budgetary increments *specifically* for certain measures designed to improve quality.

Their ingenious effort to evolve such a strategy is of special interest. Certainly it produced many more questions than answers, but it is none the less provocative and opens up an important area which merits a good deal more exploration everywhere.

The first question is: what did they mean by quality? The answer, or at least part of the answer, is revealed indirectly by the measures they proposed for improving quality—mainly by up-dating and enriching certain parts of the

1. See: *Tanzania: factors influencing change in teachers' basic salaries*, p. 37.

2. See: *Ivory Coast: the cost of introducing a reform in primary education*, volume II in this series.

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curriculum (especially science, mathematics and languages), by teacher 'upgrading' through in-service training, and by improving the supply and type of instructional materials and equipment.

One can make out a strong case, of course, for saying that none of these, separately or in combination, *guarantees* an improvement in what pupils will carry away from school. But one can also argue convincingly that *without* these things there is little hope of improving quality. This, however, is not the central issue here. The real issue that the Ceylonese planners evidently had in mind was how, as a practical matter, can a budgetary strategy be devised which will at least modify the familiar process by which annual school budget increments, won partly with the argument that they are needed, 'to improve quality', in fact end up being consumed by things which really do not improve quality? How, for example, can school administrators counter the seemingly inexorable pressures which force the percentage of the budget available for purchasing new books and other learning aids to get smaller and smaller, while the proportion going to teacher costs grows larger and larger?

The widely held assumption that higher teacher salaries will improve classroom quality is, to put it mildly, highly debatable, at least in the short run. What is far less debatable, however, is that teachers without good books and without other good aids to teaching and learning are considerably less productive, whatever their qualifications and salary may be, than if they had more of these important tools to work with. The cost of a reasonable supply of such tools is small in comparison with that of a moderate 'improvement' in the pupil/teacher ratio or a moderate general increase in teacher salaries. So also is an investment in the right kind of in-service training for teachers, designed not simply to give teachers a new credential to boost them up the salary scale, but to give them the competence to teach new curriculum content and to use new teaching aids and methods effectively.

In short, the quality of what students learn depends not only upon the formal qualifications of teachers and the level of their salaries but upon the tools which teachers and students are given to work with. If the amount spent on teachers and the amount spent on the tools (and for *training* teachers to use them) are seriously out of balance, teacher productivity and quality of education will suffer.

If we read the Ceylonese planners correctly, this is essentially what they were driving at when they spoke of 'balanced growth' and when they provided in their projections for a steady rise in the funds available for the purpose cited above from the existing trivial figure of only 0.7 to 2.0 per cent. The rate and amount of this increase is plainly arbitrary (though plausibly feasible), and the Ceylonese planners would no doubt have difficulty in proving on pedagogical or any other grounds that this amount earmarked for 'improvement of quality' would in fact have the desired effect. Even so, they have come up with one possible specific device, in harmony with the general idea of 'programme budgeting', which should stimulate us all to search for appropriate ways when drawing up our own respective budgets to curb the vicious circle of rising unit costs and (all too often) declining quality. If this case study makes others search harder in the same direction, it will have been an important contribution by Ceylon to other educational systems.

Appendix

TABLE 1. School-age population distribution by single years, 1963-1977 (in thousands)

Age	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
5-6	307.8	315.8	323.4	350.0	335.0	338.0	340.7	341.2	341.0	340.6	341.0	343.3	347.0	349.6	350.5
6-7	300.0	317.3	315.0	322.2	328.5	332.8	337.0	338.5	339.0	339.0	338.6	340.5	342.8	345.0	347.3
7-8	292.5	299.5	317.0	314.3	321.3	326.8	332.0	335.0	336.5	336.5	336.4	338.5	340.0	342.1	345.2
8-9	285.3	292.0	299.0	316.5	313.6	320.2	326.6	331.5	333.7	334.5	334.5	336.0	358.0	339.3	341.5
9-10	278.4	284.8	291.3	298.5	316.0	313.2	320.1	326.3	330.6	332.0	332.5	334.0	335.3	337.2	338.6
10-11	271.8	278.2	284.4	290.6	298.0	305.5	312.8	320.0	326.2	330.0	330.6	332.0	333.5	334.8	336.5
11-12	265.5	271.4	278.0	284.0	290.0	297.3	315.3	312.5	320.0	326.0	329.1	330.3	331.6	333.0	334.0
12-13	258.5	265.3	271.2	277.0	283.5	289.5	297.4	315.0	312.3	319.8	325.7	328.7	330.0	331.3	332.5
13-14	250.1	238.2	265.0	271.0	277.2	282.9	289.2	297.0	314.7	312.2	319.7	325.3	328.4	329.7	331.0
14-15	241.1	249.8	258.0	264.6	270.8	276.8	282.6	289.0	296.8	314.5	311.9	319.4	325.0	328.0	329.4
15-16	232.3	241.0	249.4	257.8	264.3	270.4	276.5	282.2	288.6	296.4	304.0	311.6	319.0	324.6	327.8
16-17	223.7	232.0	240.4	249.0	257.3	263.9	270.3	376.2	282.0	288.2	295.8	303.6	311.3	318.6	324.2
17-18	215.2	223.4	231.8	240.0	248.7	256.8	263.5	270.0	275.8	281.5	288.0	295.5	303.1	311.0	318.2
18-19	207.2	214.8	223.0	231.4	239.7	248.5	256.5	263.1	269.5	275.4	281.2	287.4	295.0	302.7	310.6
19-20	199.6	206.8	214.4	222.7	231.0	239.4	248.0	256.0	262.8	269.0	275.0	280.9	287.0	294.3	302.2

NOTE 1. Single year distribution for the years 1963, 1968, 1973 and 1978 worked out by the application of sprague multipliers (mini). 1963 figures based on smoothed age group totals which give total population 1 per cent higher than the actual.

2. The single year distribution for in-between years was worked out by interpolation method.

SOURCE Population projection for Ceylon 1963-78, prepared by the Technical working group of population projections, Colombo, November, 1967.

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TABLE 2. Grade 1 age distribution and enrolment, 1965

Age	Enrolment	Percentage of corresponding age group
5- 6	101,620	31.4
6- 7	170,646	54.2
7- 8	71,844	22.7
8- 9	24,063	8.0
9-10	7,766	2.7
10 and over	4,275	—

SOURCE Extracted from bibliography (13).

TABLE 3. Grade 1 age distribution and enrolment 1977 (in thousands)

Age	Popula- tion	Percent- age in school	Enrolment
5-6	350.5	25	87.6
6-7	347.3	73	253.53
7-8	345.2	19	65.59
8-9	341.5	3	10.25
TOTAL			416.97

SOURCE Extracted from bibliography (13).

TABLE 4. Age distribution and projected enrolments for grade 1, 1968-77

Description	1968	1969	1970	1971	1972 ¹	1973 ¹	1974	1975	1976	1977
Age 5-6										
Population ²	338.0	340.7	341.2	341.0	340.6	341.0	343.3	347.0	349.6	350.5
Assumed rate ³	30.7	30.0	29.2	28.6	27.9	27.2	26.5	25.8	25.1	25.0
Enrolments ⁴	103.8	102.2	100.0	97.5	95.0	92.8	91.0	89.5	87.7	87.6
Age 6-7										
Population	322.8	337.0	338.5	339.0	339.0	338.6	340.5	342.8	345.0	347.3
Assumed rate	55.9	57.6	59.4	61.2	63.0	65.0	67.0	69.0	71.0	73.0
Enrolments	180.4	194.1	201.1	207.5	213.6	220.1	228.1	236.5	245.0	253.5
Age 7-8										
Population	326.8	332.0	335.0	336.5	336.5	336.4	338.5	340.0	342.1	345.2
Assumed rate	22.4	22.1	21.8	21.4	21.0	20.6	20.2	19.8	19.4	19.0
Enrolments	73.2	73.4	73.0	72.0	70.7	69.3	68.4	67.3	66.4	65.6
Age 8-9										
Population	320.2	326.6	331.5	333.7	334.5	334.5	336.0	338.0	339.3	341.5
Assumed rate	7.5	7.0	6.5	6.0	5.5	5.0	4.5	4.0	3.5	3.0
Enrolments	24.0	22.9	21.5	20.0	18.4	16.7	15.1	14.3	11.9	10.2
Age 9-10⁴										
Population	313.2	320.1	326.3	330.6	332.0	332.5	334.0	335.3	337.2	338.6
Assumed rate	2.4	2.1	1.8	1.5	1.2	0.9	0.6	0.3	0.0	0.0
Enrolments	7.5	6.7	6.9	5.0	4.0	3.0	2.0	1.0	0.0	0.0
TOTAL	388.9	399.3	401.5	402.0	401.7	401.9	404.6	408.6	411.0	416.9

1. Enrolments figures for the years 1972 and 1973 were adjusted for the SOURCE Extracted from bibliography (13).

2. Figures in thousands.

3. Percentage.

4. Enrolments for 9 - 10 age group are for 9 years and above.

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TABLE 5. Retention rates assumed for projection 1968-77

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1976
<i>Level I</i>										
Grade 1	106.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Grade 2	87.0	88.0	89.0	90.0	90.5	91.0	91.5	92.0	92.5	93.0
Grade 3	83.0	83.2	83.4	83.6	83.8	84.0	84.2	84.4	84.7	85.0
Grade 4	71.3	71.9	72.5	73.1	73.7	74.3	74.9	75.6	76.3	77.0
Grade 5	83.0	65.8	66.0	66.2	66.5	66.8	67.1	67.4	67.7	68.0
Grade 6	60.0	92.0	60.8	61.2	61.6	62.0	62.5	63.0	63.5	64.0
Grade 7	53.1	53.5	89.1	54.3	54.7	55.1	55.5	55.9	56.3	57.0
Grade 8	44.7	45.5	46.3	87.3	47.9	48.7	49.5	50.3	51.1	52.0
<i>Level II</i>										
Grade 8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Grade 9	86.4	86.8	87.2	87.6	88.0	88.4	88.8	89.2	89.6	90.0
Grade 10	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
Grade 11	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2
Grade 12	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
NOTE	These rates are for general education only.									
SOURCE	Extracted from bibliography (13).									

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USSR

4

**Economic planning
and the financing of higher education**

prepared by D. Chuprunov and L. Tul'chinskii

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Introduction

The USSR is a multi-national state, made up of more than a hundred nationalities, and at present includes fifteen union republics, twenty autonomous republics, eight autonomous provinces and ten national regions.

During the fifty years in which the USSR has existed, huge developments have taken place in the field of higher education. At the beginning of the 1967/68 academic year, there were 785 higher educational establishments with 4,311,000 students, of whom 1,890,000 were full-time and 2,421,000 were part-time students already in employment; this latter figure included 652,000 on evening courses and 1,769,000 taking correspondence courses. At the beginning of the 1967/68 academic year there were 182 students enrolled in higher educational establishments in the USSR per ten thousand of the population.

The annual intake of students into universities and colleges to take the first-year course has risen to 900,000, about half of whom are accepted as full-time students. In the next few years the proportion of students enrolled full-time will increase, and by 1975 it will amount to 60 per cent of the total intake into colleges.

Higher educational establishments are located in all the union republics, also in many of the autonomous republics and autonomous provinces. Before the October Socialist Revolution of 1917 there were no colleges in, for instance, Byelorussia, Azerbaidjan, Lithuania, Armenia, Moldavia, central Asia or Kazakhstan, but now 19.3 per cent of all the students in the country are studying in these republics. Each union republic now has a university, as well as polytechnical, medical, teacher-training and other institutes.

In the USSR, all citizens have equal opportunity to receive higher education on the basis of their academic merit. The appendix shows the numbers of students at higher educational establishments in the autonomous republics and autonomous provinces.

Equal opportunity in higher education is provided in practice, in the USSR, by the system of students' grants and other forms of material aid, and by democratic principles of admission to universities; these principles are based on the criterion of the level of knowledge of school-leavers.

The number of specialists with higher education employed in the national economy has increased greatly during the years of Soviet power. The appendix sets out the current figures and shows that a relatively large proportion of these specialists are women. Higher education is in fact extensively available to Soviet women. The proportion of women among students in the 1967/68 academic year was 46 per cent; in special subjects such as economics and law the proportion was 58 per cent, while in education, art and cinematography it was 65 per cent.

During the past fifty years the scientific and technical progress made in the USSR has resulted in a considerable increase in the number of experts in the labour force, also of engineers, technicians and other categories of personnel with higher education. Between 1918 and 1967 7.4 million students passed through

higher educational establishments in the USSR. In 1967, 13.9 million specialists with diplomas were employed in the national economy; of these, 5.6 million had been through higher education. By the end of 1967, there were 796,600 scientific workers at scientific establishments, universities and other organizations. Table 1 sets out the increases in the number of students at higher educational establishments in the USSR since 1914.

TABLE 1. Total students (full-time and part-time) at higher educational establishments in the USSR, 1914/15-1970/71 (in thousands)

	Academic years								
	1914/15	1940/41	1945/46	1950/51	1958/59	1965/66	1966/67	1967/68	1970/71 ¹
Number of students	127	812	730	1 247	2 179	3 861	4 123	4 311	5 000
Graduates	...	126	...	177	291	401	432	479	—
1. Estimated.									

At universities in the USSR, training is available in all branches of the national economy in a wide range of special subjects; at present the number of special subjects is about 400.

Universities and colleges in the USSR currently produce about 0.5 million graduates annually to work in the different branches of the national economy, a figure which meets the current requirements. In 1967, all universities and colleges in the country produced 479,500 graduates, of whom 168,900 went into industry and engineering, 21,700 into transportation and communications, 39,200 into agriculture, 38,600 into economics and law, 33,500 into medical sciences, physical culture and sport, 172,500 into teaching, and 5,400 into art and cinematographic establishments.

I. Economic planning of higher education

A. National economic planning as the basis of the financial planning of higher education

The planning of higher education in the USSR has become a realistic objective only under the Socialist economic system, based as it is on public responsibility for the means of production and the combination of all educational establishments under a single state or collective co-operative responsibility system. The planning of production and of the distribution of the national product is the basis on which higher education is planned.

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Three basic concepts govern the planning of higher education: firstly, the unified and democratically centralized planned supervision of higher education by the state; secondly, the planned development of higher education, including the establishment of optimum proportions between different sectors of national production and the training of personnel for them; and thirdly, the observance of a definite relationship between the standards to which workers with different qualifications are trained, the possibilities for developing different sectors of the economy and for planning the training of experts for these sectors.

The planning of higher education in the USSR is an essential part of national economic planning. It takes into consideration the different indices in the national economic plan, the budget, the financial plans of state undertakings, and the financial plans of co-operative and public organizations. This makes it possible to establish the required 'mix' in the development of higher education in the light of the country's budgetary situation, the economic and cultural development of the country, and the need to provide the country with experts with higher qualifications.

What it is important to emphasize is that in the USSR higher education is planned in unison with the development plans for the different sectors of the nation's economy. This means, for example, that priority is given to training personnel for those branches of the national economy which are developing rapidly and which bring the largest benefits to society. The plan for the development of higher education is calculated both in quantitative terms (numbers of students, graduation of experts, etc.) and in financial terms. The former aspect is dealt with by the USSR State planning commission (*Gosplan*) and the planning organizations, the second by the USSR Ministry of finance and the financial organizations.

Since higher education is a field affecting the interests of the *entire* population, in the USSR its development is planned in advance (for five-year periods) with the greatest possible participation (teachers and other experts, parents, students, etc.) through the press, radio and television, by conferences, symposia and congresses, by deputations, and with the participation of representatives of factories and collective farms, also by planning organizations. These latter organizations summarize public opinion, and make appropriate recommendations to the government.

There are three stages in planning the development of higher education in the USSR: long-term forecasting; the five-year plans; and the annual plans.

The long-term forecasting (over a period of fifteen to twenty years) determines the principal features of the development of higher education in the over-all plan, both along qualitative lines and also, though to a lesser extent, in its quantitative aspects. This long-term forecasting takes technical progress into account, within the framework of the over-all development of society for the next twenty years or so. Forecasting does not pretend to foresee the future but aims merely at reducing the number of unknown quantities and selecting the least likely and most likely of all possible paths which the future may take. A planned socialist system makes it objectively possible to guide progress on a reliable scientific basis.

The socialist economic system, with its centralized state planning and centralized state finances, makes it possible to achieve the optimum long-term planning for the training of experts with higher qualifications, taking the following into account: (a) the requirements of an increasing population; (b) keeping the correct correlation between the forecast level of the technical complexity of different jobs and the level of training of personnel, also between the prospects for development in individual fields (allowing for technical progress) and the forecast planning of the training of personnel for these fields; (c) forecasting the principal lines to be followed by scientific research, general tendencies, and target dates for the application of the results of this research in the national economy; (d) assessing the standard which will be required of university and college graduates, during the forecast period, as regards professional knowledge, skills and experience.

The five-year plans tackle the tactical problems, the annual plans the operative problems.

On the basis of analysing the existing position, the annual plans allow for changes in production conditions which have not previously been foreseen. These annual national economy plans provide for the admission of new students to higher education and for the output of graduates from universities and colleges, by types of study (daily, evening, correspondence). These plans are drawn up for the USSR as a whole and also sub-divided among union republics, ministries and departments responsible for higher educational establishments. Every special subject in these plans is approved by the Councils of Ministers of the Union Republics, and by USSR ministries and departments, by agreement with the USSR *Gosplan* and the USSR Ministry of higher and secondary specialized education.

The over-all higher educational plan for the training of experts is worked out on the basis of the numbers of experts required by different sectors of the national economy. It is prepared by the USSR and union republican ministries and departments responsible for higher educational establishments, on the basis of the calculated additional numbers of experts required, by plan-period years. The following factors are considered during the planning process: (a) the priority development of the full-time form of study, and the radical improvement of evening classes and correspondence courses; (b) the most accurate assessments of numbers of experts needed with higher education; (c) improved geographical distribution for the training of experts, taking into account the numbers of graduates required in the separate economic regions; (d) improved co-operation between union republics, ministries and departments in the training of experts with higher education in specialized professions, for which there is only a small demand in certain union republics and economic regions; (e) further improvement in the allocation and utilization in the national economy of higher education graduates.

The draft plans for the training of experts are linked up with the plans for capital construction, and for the introduction of new higher educational establishments, laboratories and students' hostels.

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B. The five-year plans for higher educational establishments

At most large universities and colleges in the country, the five-year plan for the development of the establishment is worked out on the basis of ministerial (or departmental) control figures, produced by the responsible ministry or department. The plan defines the principal guidelines to be followed by the university or college in its development, covering such aspects as the increase in student numbers, improvement in teaching methods, and the further development of scientific research.

The five-year plans for the development of higher educational establishments are drawn up by the principal of each establishment, with the active participation of the entire staff and interested local organizations.

Great importance is placed on extensive participation in the ensuing *discussion* of draft plans for universities and colleges. Not only will groups of people take part who are directly concerned with the organization of a particular establishment, but also, to some extent, the responsible officials of factories, organizations and collective farms, who are the 'consumers' of graduates from universities and colleges.

Extensive participation in the discussion of a draft development plan for a higher educational establishment does not always mean that all different points of view will be reconciled. On the basis of the discussions, the principal's staff select the best variation of the plan. If different opinions are not taken into account, the five-year plan for a university or college might become of an authoritarian nature, which would be harmful to the national economy and have a bad effect on the interest of the country.

The five-year plan for a university or college is the result not so much of individual administrative actions as of the preliminary critical assessment of activities and of planning ahead, with large numbers of teachers, students and members of the public taking part. The office of the principal of the university or college co-ordinates the different views into one document, which is then considered in detail by the Academic council of the establishment. It is later confirmed by the ministry responsible for the particular university or college.

The plan for the development of a higher educational establishment consists of the following sections: 1. planning the general structure of training; 2. improving the quality of instruction; 3. scientific work; 4. training of scientific personnel and raising the qualifications of professors and lecturers; 5. development of facilities; 6. manpower requirements and salary scales.

1. *Planning the general structure of training* includes:

- a. Determination and approval of the list of special subjects in which courses will be offered;
- b. Determination of proportions between full-time and part-time courses;
- c. Establishing the numbers of students and graduates (either full-time or part-time) in accordance with the control figures in the intake plans, for each year of the five-year period;

- d. Making provision for courses aimed at raising the qualifications of experts already employed.

2. *Improving the quality of instruction* includes:

- a. Improving the selection of candidates entering higher educational institutes, by means of:
 - (i) Organizing vocational guidance courses for students at secondary schools;
 - (ii) Organizing preparatory courses for university and college entrance;
 - (iii) Organizing scientific groups at secondary schools and at higher educational institutes for secondary school students supervised by the teaching staff of the institutes;
 - (iv) Organizing competitions for students at secondary schools in the subjects in which they are specializing;
 - (v) Working out measures for activities emphasizing qualities of leadership at general educational schools;
 - (vi) Preparing educational radio and television broadcasts to assist entrants to higher educational establishments;
 - (vii) Working out measures to assist young factory workers to receive training for entrance to higher educational establishments.
- b. Improving teaching methods, by means of:
 - (i) Organizing scientific conferences and seminars to raise the standard of teaching individual syllabuses, courses and subjects;
 - (ii) Revising and producing new textbooks, manuals and visual teaching equipment;
 - (iii) Modelling current teaching practice on the experience of the best professors and lecturers;
 - (iv) Developing the scientific organization of the teaching process.
- c. Using new educational media in teaching, which includes:
 - (i) Film techniques—films, slides, and other visual teaching equipment;
 - (ii) Educational television, (with television receivers available in the colleges), teaching machines, etc.
- d. General measures for educational improvement, including:
 - (i) Development of innovations of a theoretical, ideological and cultural nature;
 - (ii) Making provision for the development of students' independent activities (students' scientific societies, conferences, physical education and cultural activities);
 - (iii) Ensuring that each establishment meets the required standard in all facets of its activities.

3. *The scientific work* includes:

- a. Determination of the scientific research to be carried out;
- b. Linking scientific research projects with the appropriate scientific

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- research institutes, with laboratories, and with individual scientists;
- c. Setting up new scientific establishments (institutes, laboratories for special subjects, etc.).

4. *Training of scientific personnel and raising the qualifications of professors and lecturers.* This includes:

- a. Producing sufficient scientists to meet current manpower requirements;
- b. Extending and improving post-graduate studentship work;
- c. Improving the qualifications of scientific teaching personnel (preparing and defending graduate and doctorate dissertations; courses for the improvement of qualifications; scientific methodology conferences, meetings, seminars, etc.).

5. *Development of facilities* includes:

- a. Construction or reconditioning of buildings (or completion of those under construction), including hostels, instructional premises in factories, and cultural and domestic buildings.

6. *Manpower requirements and salary scales* includes:

- a. Forecasting the numbers of professors, lecturers, teaching assistants, and administrative personnel required at higher educational establishments;
- b. Forecasting the numbers of scientific and auxiliary personnel needed by scientific establishments financed by the state budget, also the number of staff members working under agreements with factories;
- c. Determining the salary scales for the staffs of educational establishments.
- d. Estimating the costs of running educational establishments (excluding expenditure on major work) for each year in the five-year plan.

Planning the financial requirements for the five years is an important part of a five-year plan for a university or college. The finances required are determined on the basis of the quantitative figures in the plan (intake of students, numbers graduating, total number of students, numbers of professors and lecturers, etc.).

The financial requirements of a university or college for the five-year period are agreed with the responsible ministry, then allocated for each year of the five-year plan. Annual financial planning is carried out, in accordance with this procedure, at each individual higher educational establishment.

C. Financial planning at individual higher educational establishments

The complex and diversified activities of higher educational establishments mean that in all sectors they must be effectively organized and planned on a single integrated basis. At most universities and colleges in the country, the financial plan is closely associated with the teaching plan; in many cases there is a single

plan, which we may call the teaching-finance plan (*uchfinplan*). This plan is considered in detail by the Scientific council of the university or college concerned.

The *uchfinplan* is a document defining the instructional programme and the amounts of finance, materials and labour required to fulfil this programme in the forthcoming year. As a rule, the *uchfinplan* is in two parts, the teaching plan and the estimated budget allocations. At some establishments the *uchfinplan* may also include estimated figures for special funds (not included in the budget), or a financial plan covering training facilities in factories and agricultural undertakings, or in other sub-sectors of the educational establishments which are not charged to the budget.

The *teaching plan* defines the subjects taught at any particular university or college and the amount of time allocated to each subject. The number of hours to be spent on studying individual subjects is calculated in relation to such factors as the type of higher educational establishment, its specialization (the humanities, technical subjects, medicine, etc.), the importance of individual subjects to particular vocations or professions, the over-all duration of the course, and the ratio of theoretical to practical work involved.

When numbers of students are being determined for the *uchfinplan*, allowance must be made for the fact that the figures for 1 January do not remain static throughout the year. The reason is that the number of students financed at universities and colleges between 1 January and 31 August relates to the university year, and from the beginning of the new university year there is a fresh total number of students, based on the new intake and the number of graduates. During the budgetary year, which is the same as the calendar year, the number of students at universities and colleges changes.

In order, therefore, that these changes in the number of planned units should be represented in the calculations, all the annual total figures for expenditure at universities and colleges are calculated on the basis of the average annual number of students.

The average annual number of students is found by using the equation:

$$Kc = \frac{(K_1 \times M_1) + (K_2 \times M_2)}{12} \text{ where:}$$

Kc is the average number of students;

K_1 is the number of students at the beginning of the planned year;

M_1 is the number of months for which the transitory number of students functions;

K_2 is the number of students at the end of the plan year;

M_2 is the number of months for which the number of students functions after increase (or decrease).

In planning expenditure figures at individual higher educational establishments the following principles apply.

The expenditure figures are determined on the basis of the indices in the plan for the national economy, and are given in the estimates by purposes (salaries,

administrative expenses, missions and official journeys, educational expenditure, expenditure on food, etc.).

The expenditure at a university or college is planned under two main category headings: current expenditure and expenditure on the expansion of the university or college (with the exception of capital outlay under the national economy plan, for which separate plans are made).

The planning of current expenditure includes expenditure on salaries, and operational expenditure governed by the specific activities at individual universities or colleges, also administrative and domestic expenditure.

The total current expenditure at any university or college is determined on the basis of the *state norms*, taking into account the actual amounts of funds required. The method by which expenditure is normed is the basis on which expenditure on the current upkeep of universities and colleges is calculated, and makes it possible to compare the requirements of similar universities and colleges. The norming of expenditure figures is aimed at the equal treatment of similar universities and colleges, and follows the principle of the utilization of budget allocations for the particular special purposes of the establishments concerned.

The norms are *material or financial*, according to how they are expressed. The material norms govern the expenditure of physical resources per natural calculated unit, and the financial norms are the financial expression of the material norms, on the basis of the effective prices. When the financial norms are considered, it is necessary to define the concept of the 'budget norm'. The financial norm represents the total financial expenditure per planned unit, while the budget norm represents the proportion of the expenditure covered by budget allocations.

The expenditure norms are also subdivided into *compulsory* and *calculated (optional) norms*. The compulsory norms are those norms which are in most cases established by the government, and these norms must be strictly observed when estimates are made out and carried out by universities and colleges. The calculated norms, which are mean expenditure norms per calculated unit, are established by departments and agreed with the financial organizations. When the calculated norms are determined, the activities of universities or colleges in particular republics, provinces or regions are taken into account. As an example, the expenditure norms for heating are established on the basis of the central heating season in the locality concerned.

Using the norm method, the total expenditure at particular universities or colleges is determined by finding the product of the number of planned units and the expenditure norm established per unit. In addition to the norms, a large proportion of the estimated expenditure figures for universities and colleges are calculated directly, i.e. on the basis of calculated figures for each heading. This allows for the special conditions under which particular higher educational establishments may have to operate.

The *estimated budgetary allocation* governs the annual expenditure by an educational establishment and includes the total allocation, its subdivision by subjects, and its quarterly distribution, for the upkeep and extension of the university or college concerned. The estimate is compiled from a precisely specified range of

items of expenditure. This range is a standardized list of headings, numbered by a standard method, established from the budget expenditure classification. It is drawn up by the USSR Ministry of finance and must be followed by all higher educational establishments.

The following headings are used: salaries; salary allowances; stationery and domestic services; teaching costs, expenditure on practical industrial work, scientific research work and purchase of books for libraries; catering supplies; equipment and stores; soft furnishings and clothing; capital outlay for building projects; major building repairs; missions and official journeys; students' grants; miscellaneous expenditure.

Salaries. Expenditure on this item represents a high proportion of the costs of higher educational establishments (45–48 per cent), and is calculated separately for full-time teaching staff, part-time teachers, administrative staff, technical staff and other personnel.

The total staff costs for professors and lecturers at a particular establishment are calculated on the basis of two indices: the number of posts; and the salary rates applicable for different duties. The number of posts is determined by the responsible ministry or department, on the basis of the number of undergraduate and post-graduate students per member of the teaching staff. For evening class and correspondence departments these coefficients are established by groups of universities, colleges and facilities, in accordance with the training programme. For full-time higher educational establishments they are established from the effective norm figures for the numbers of students per member of the teaching staff.

The salary scales for all categories of employees at higher educational establishments are set by USSR governmental decrees. They are differentiated according to the particular nature of the post, its rank (professorship, lectureship, assistant lectureship, etc.), the academic qualifications of the incumbent and his length of service in teaching. In the USSR there is a relatively wide differentiation in salaries between, on the one hand, professors and lecturers—particularly those with good academic qualifications—and, on the other hand, other categories of workers and employees. For this reason the number of staff in the first category who leave universities or colleges because of grievances over their salaries is extremely small. In addition to natural wastage, some professors and lecturers transfer to research organizations for reasons of academic interest, but this is still only a small proportion.

Personal additions may be made to the salaries of individual staff members or highly qualified personnel. There are also special additions to salaries for staff working in the far north of the country, or in other remote areas.

Teachers who are not full-time staff members are reimbursed on the basis of hourly rates, calculated as a fraction of the annual salary received by staff members.

In planning the global sum payable in salaries to administrative staff at individual colleges, this is generally determined by considering the number of post at the

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establishment concerned, in conjunction with the approved salary scales, or alternatively on the basis of standardized staffing norms, if such norms are available.

Payments to personnel not on the staff for individual work and services are made under other appropriate budget headings. For example, payments due to people for the binding of accounting ledgers would be made not under the heading of 'salaries' but under the item, 'stationery and domestic services'.

Salary allowances. This heading includes allocations to cover contributions under the state social security system for the staff of an educational establishment. Such payments for personnel not on the staff are made under other appropriate headings, as above.

Stationery and domestic services covers expenditure on the purchase of inexpensive items, costing up to two roubles each or supplies with an expected 'life' of less than one year. Typical supplies include ledger books, forms, records, handbooks, bulletins, official publications and periodicals (except those purchased for the library), and medicaments. Domestic services include expenditure on heating, lighting, water, laundry, telephone, radio, postal charges, the upkeep of the establishments' buildings, roads, grounds, vehicles, and equipment.

Teaching supplies, expenditure on practical industrial work, scientific research work and purchase of books for libraries. For teaching supplies (including library books) this item is planned on the basis of standards, dependent on the form of study (full-time, evening or correspondence) and on the courses offered at each university or college. Expenditure on practical industrial work is governed by the number of students involved and the duration of the work. This expenditure also includes payments to instructors supervising the practical work, payments for their travel, daily allowances and *ad hoc* grants to students.

Catering supplies for students at higher educational establishments; this item is calculated in accordance with governmental norms and includes payment for products from subsidiary farms.

Equipment and stores includes expenditure on the purchase of equipment and stores costing two roubles or more per unit. In the over-all planning process the total sum under this expenditure is again determined by standardized norms per student, according to the type of educational establishment. Typical items are tables, cabinets, chairs, etc., office furniture, blackboards, classroom furniture, kitchen and dining-hall equipment, refrigerators, dining-hall fittings, accounting equipment and typewriters. Expenditures on large quantities of small items (plates, pots and pans, etc.) is also included under this heading when they are bought for newly organized educational establishments, although they may cost less than two roubles per item. This heading also includes delivery charges for new equipment and stores.

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Soft furnishing and clothing covers expenditure on purchasing or manufacturing linen, clothing, footwear and bedding for students.

Capital outlay for building projects includes expenditure on buildings and equipping new universities and colleges.

Major building repairs are based on draft individual estimates compiled for each university and college, and submitted for examination and approval to the responsible ministry or department. The ministry or department, before approving the estimate, will verify that it corresponds to the current national indices and to the expenditure norms.

Missions and official journeys. This heading includes expenditure on journeys and daily allowances for official missions to congresses and symposia, etc., also payment for official journeys within the local area of the university or college.

Students' grants covers a considerable proportion of the expenditure in the full-time study departments of universities and colleges; the total expenditure is determined on the basis of the number of grants awarded at each university or college and the value of the grants awarded to individual groups of undergraduate or post-graduate students.

Miscellaneous expenditure. This includes expenditure on the organization of cultural activities, physical education activities and other group activities at higher educational establishments.

Tables 2 and 3 provide good illustrations of the use of the budgetary headings in practice. Table 2 gives the over-all expenditure from the national budget of the USSR on higher educational establishments over a ten-year period. Table 3 shows recent national budget allocations to selected higher educational establishments in Moscow.

What budget finance rights does a university or college have? The principal of each university or colleges has the same right as the head of a factory to plan and organize the financial resources of his establishment.

Every higher educational establishment has its own statutes, its own financial balance, its own current account at the state bank, its own teaching finance plan (*uchfinplan*), and its own budget estimate. Within the approved estimate for the expenditure of budget funds, the principal has the right to approve and redistribute expenditure under all headings except salaries and salary allowances, the students' grants fund, the expenditure on capital repairs, the purchase of stores and equipment, and the capital outlay fund.

The principal of a university or college also has the right, by agreement with the public organizations, to utilize up to 1 per cent of the students' grant fund for material assistance to temporarily needy students and for making awards for exceptional teaching, scientific and communal work.

TABLE 2. Expenditure from the national budget on higher educational establishments in the USSR, 1959-68 (in million roubles)

Budgetary heading	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Salaries	482.7	491.7	521.4	568.2	601.1	646.1	719.7	776.8	855.9	919.8
Salary allowances	26.3	27.0	29.0	31.7	33.5	35.9	40.1	40.7	46.5	49.4
Stationery and domestic services	49.3	51.8	54.8	57.4	63.4	66.9	71.6	77.3	82.8	91.2
Missions and official journeys	1.9	1.9	1.9	2.0	1.9	1.9	2.1	2.1	2.3	2.4
Teaching supplies ¹	62.7	66.1	70.3	74.7	72.2	77.5	83.1	88.2	93.8	101.2
Students' grants	354.5	333.3	337.9	349.3	373.5	399.4	436.4	473.9	532.6	584.1
Catering supplies	2.3	2.4	2.4	3.1	3.3	3.5	4.0	4.3	4.7	5.6
Equipment and stores	37.1	44.9	48.3	47.4	43.5	42.9	47.2	55.8	56.3	60.4
Soft furnishings and clothing	9.7	11.1	12.4	14.0	15.5	17.1	17.5	19.4	21.6	26.2
Capital outlay for building projects (under the state plan)	81.1	90.5	76.9	86.5	99.3	98.6	106.6	95.3	93.6	110.5
Major building repairs	27.7	31.5	33.3	34.6	36.6	38.1	42.4	46.1	50.6	53.9
Capital outlay for building projects (outside the state plan)	0.2	0.4	4.1	0.9	4.6	3.5	3.9	0.4	0.2	3.6
Miscellaneous expenditure	16.8	14.5	15.5	16.6	16.9	18.5	19.2	25.2	20.6	22.3
TOTAL	1 152.3	1 167.1	1 208.2	1 286.4	1 365.3	1 449.9	1 593.8	1 705.5	1 844.5	2 030.6

1. Also includes expenditure on practical industrial work, scientific research work, and purchase of books for libraries.

TABLE 3. National budget allocations to selected higher educational establishments in Moscow, 1967-69 (in thousand roubles)

Budgetary heading	Lomonosov National University, Moscow			Bauman Higher Tech. College, Moscow			Orjonikidze Tech. and Econ. Inst., Moscow		
	1967	1968	1969 ¹	1967	1968	1969 ¹	1967	1968	1969 ¹
Salaries	19 115.9	20 443.1	21 138.1	5 922.7	6 409.0	6 835.0	1 384.7	1 481.8	1 613.9
Salary allowances	1 090.7	1 119.8	1 171.0	322.9	336.8	369.0	80.4	80.9	90.6
Stationery and domestic services	3 768.1	4 415.3	4 370.2	546.7	609.3	948.0	98.0	102.5	100.2
Missions and official journeys	16.5	16.0	15.7	3.6	4.5	2.0	0.6	0.8	0.8
Teaching supplies ²	2 870.3	3 195.9	3 072.9	743.7	771.8	824.0	87.6	99.2	118.9
Students' grants	8 494.1	9 263.0	10 077.9	4 791.0	5 153.6	5 629.0	657.5	725.6	897.3
Catering supplies	100.3	114.7	109.0	4.4	5.0	5.0	0.3	0.3	0.4
Equipment and stores	2 064.4	2 054.1	2 002.3	234.5	254.9	280.0	60.0	60.0	70.0
Soft furnishing and clothing	321.3	277.8	239.0	123.0	131.1	119.0	2.7	30.5	14.6
Major building repairs	825.1	855.4	890.0	288.7	260.0	320.0	80.0	55.0	70.0
Miscellaneous expenditure	415.2	492.6	550.1	157.6	154.9	172.4	20.4	21.1	25.2
TOTAL	39 081.9	42 247.7	43 636.2	13 138.8	14 090.9	15 503.4	2 472.2	2 657.7	3 001.9

1. Estimated.

2. Also includes expenditure on practical industrial work, scientific research work, and purchase of books for libraries.

In addition, the principal has the right to choose the staff members of the establishment and to fix their salaries within the approved salary scales. It is also his right to introduce his own control procedures over administrative estimates and expenditure.

In addition to their rights, the heads of higher educational establishments also have definite *juridical and material responsibilities*, in line with socialist laws and state discipline; they are responsible in particular for estimates being compiled on a sound economic basis, for the correct, economic and effective expenditure of state funds, for the observance of the established standards for feeding, paying grants to, and satisfying the other materials needs of students, and for the maintenance and effective use of property and materials.

Soviet legislation provides that higher educational establishments are responsible for carrying out their obligations and for the property at their disposal. Material sanctions can be applied to them: their finances can be cut, or in certain cases discontinued. For example, if an educational establishment has not fulfilled its plan for student intake, the budget allocations for salaries, foodstuffs and other expenditure—the amount of which is directly associated with the fulfilment of these plans—may be reduced. Alternatively if an educational establishment has accumulated stocks of material property above the norms, budget allocations may be reduced or allowance made in the financing for the next budgetary year. Financial resources are also reduced if, during inspections or checks, it is found that the estimate for a university or college includes excessive requirements.

II. The financing of higher education

A. Sources of finance

There are two main aspects of financial policy with regard to higher education. Firstly, the expenditure on the training of new experts at universities and colleges; this aspect is normally financed by the state budget. Secondly, the expenditure on the in-service training of experts to improve their professional knowledge, an aspect which is normally financed by individual factories and organizations.

Table 4 shows the increase in expenditure on higher education from the national budget during the past thirty years.

The figures in this table, it should be noted, represent only a part of the expenditure by Soviet society on higher education (the national budget expenditure). The figures do not in any sense represent the global expenditure on higher education, or the proportion of public consumer funds or the national income allocated to higher education in the USSR. To complete the picture the following should be added to the total budget expenditure figures:

TABLE 4. Expenditure on higher education from the national budget

Years	Expenditure from the budget on higher education (million roubles)	As percentages of:			Budget expenditure figures on higher education per head of the population (roubles)
		National income	Public consumer funds	The USSR state budget	
1940	288	0.86	6.26	1.65	1.48
1950	721	1.31	5.54	1.74	4.03
1958	1 141	0.89	4.79	1.77	5.57
1959	1 152	0.84	4.52	1.63	5.51
1960	1 167	0.80	4.28	1.59	5.50
1961	1 208	0.79	4.08	1.58	5.59
1962	1 286	0.78	4.03	1.56	5.84
1963	1 365	0.81	3.98	1.57	6.12
1964	1 450	0.80	2.53	1.57	6.42
1965	1 594	0.83	3.84	1.57	6.96
1966	1 705	0.83	3.75	1.61	7.35
1967	1 845	0.84	3.76	1.60	7.88
1970 (estimated)	2 400	0.88	4.13	1.65	9.00

1. Factories, organizations and collective farms spend considerable amounts on higher education from their group (collective) funds, in particular for the payment of grants to students studying by correspondence, at evening classes and at faculties, with additional paid study leave, etc.
2. The co-operative and public organizations make financial allocations to higher education. For instance, the USSR Consumers' Co-operative Union provided funds for five higher educational establishments in 1967, the Trades Union Council provided funds for two, the USSR Union of Writers provided funds for one, etc.
3. Every year considerable allocations are made from the accumulation fund for the construction of new universities and colleges and the extension of existing premises. This expenditures is shown in the ministerial and departmental estimates.
4. The mass media organizations (radio, television, the press, etc.) spend a certain proportion of their funds on higher education.
5. Society as a whole makes a considerable contribution in that every year about two million young people, at the peak of their development and fully capable of work, are withdrawn on a full-time basis from the national economy to follow their studies. (Not all economists, incidentally, support this concept of the possible loss to society.)
6. A certain proportion of the funds allocated to higher education comes from the family budget (upkeep, the purchase of textbooks and study equipment, clothing, etc.).

This wide range of sources of finance, and the different forms it takes (direct and indirect) make it difficult to assess the global financial expenditure on higher education, and assessments are, therefore, necessarily approximate. However,

for 1967 it has been estimated that about 2.5 thousand million roubles were spent, from all sources, on higher education.

The USSR makes full provision for the development of higher education from its own internal national resources, although these same resources are used to finance the training of a large number of foreign students.

Higher education in the USSR is a state institution; there are and can be no private universities or colleges in the USSR. The sources from which universities and colleges are financed are therefore as follows: the USSR budget, the union republic budgets, local budgets, also finance from co-operative and public organizations according to the affiliation of the higher educational establishments concerned.

According to the ministries and departments to which universities and colleges are responsible, they are financed by allocations from the USSR and union republican ministries of higher and secondary specialized education, the union republican ministries of national education, health, transport and trade, and other ministries and departments.

The principal source of revenue for the USSR national budget, which includes the Union budget and the union republican budgets (republican and local budgets) consists of contributions from the national economy (91.4 per cent of the total budget income). Contributions from socialist undertakings and organizations are consequently the principal and decisive sources from which higher education is financed in the USSR.

In the USSR there is no direct connexion or relationship between the state income and the budget expenditure on higher education. The allocations to higher education are made on the basis of USSR *Gosplan* calculations of the number of persons with higher qualifications required. This is the basic and determinant criterion. Consequently, the financial resources devoted to higher education are governed by the required development of higher education.

B. Cost indices and higher education

Higher education in the USSR is free to all citizens, whatever their race, nationality, sex, financial circumstances, social position or religion. Higher educational establishments train the labour force, which under socialism is not a commercial product, since the workers are the collective owners of the means of production. In a socialist society the importance of any particular form of higher education or any particular trade or profession is not governed solely by its subsequent capacity for making profits or economic effectiveness. What are considered primarily are the requirements of the national economy, and the social and cultural needs of the workers.

It would not, however, be right to ignore the cost indices and not analyse their tendencies, for this would mean that higher education could be developed solely by administrators, making no allowance for economic indices. When the development of higher education is planned in practice, therefore, the cost indices are taken into account.

Every year the fulfilment of the plan is also analysed by cost indices for every university or college by the planning and financial organizations; these cost indices are the capital outlay figures, the figures for the current upkeep and teaching of students, in particular the payment of grants and administrative expenses, the improvement of conditions for the students, etc. The cost indices are used, for example, in determining the length of courses in particular special subjects, the working out of syllabuses and their contents, the filling of vacancies in teaching groups and education flows, the allocation of work to professors and lecturers, etc.

There are two methods of making economies at universities or colleges. The first is to utilize finance, labour and materials more efficiently in the training of graduates. The second is to make more effective use of graduates. In this second respect a number of measures are taken, including: reducing the migration of young graduates; keeping them in the appointments to which they are sent upon graduation; providing the necessary standard of social, cultural and living conditions in the industry in which they work; making it possible for them to improve their qualifications, get ahead in industry, achieve higher pay, etc.

Analysis of the growth in the cost indices—for instance the budget allocations to higher education per head of the population or the cost of training students at universities or colleges—shows that these have increased almost fivefold in the USSR since before the war. This has been due to increases in prices, salary rates, and students' grants, but most of all to the considerable increase in capital outlay, and on the expenditure of equipping and maintaining higher educational facilities.

Conclusion

What this report has clearly shown is the great importance placed on the planned development of higher education in the USSR, an importance epitomized by the *uchfinplan* (teaching-finance plan) which is drawn up for each individual higher educational establishment.

Although our interest in this report has been focussed on the financial aspects of higher education, it should be stressed that at the planning stage these financial aspects are considered concurrently with the qualitative aspects of higher education. This in itself constitutes something of an original approach to the planning operation, and is being adopted with success in a number of other socialist countries.

In addition, in calculating the financial aspects of planning in the USSR, several features of a rather uncommon nature are employed, among them the extensive use of standardized norms for both student numbers and items of expenditure. These norms are at the foundation of the whole planning operation

4. USSR: 1

and in practice greatly simplify the task of costing the plans. The norms also ensure that, as far as possible, equal treatment is given to similar higher educational establishments.

Also, in order to arrive at a complete and accurate picture of the financial implications involved in the planning of higher education, the standardized list of budgetary headings covering a precisely specified range of items of expenditure is of great assistance. These headings, which must be followed by all higher educational establishments, not only facilitate the whole process of the compilations of the necessary statistics, but provide for a high degree of budgetary control over higher educational establishments varying greatly in character, scattered over a territory occupying almost one seventh of the land area of the world.

Appendix

Students at higher educational establishments in the autonomous republics and autonomous provinces of the USSR, 1966/67

Nationality	Students (in thousands)	Nationality	Students (in thousands)
Tatar	73.2	Mari	4.1
Daghestan	16.2	Karakalpak	3.7
Chuvash	15.9	Chechen	3.6
Bashkir	12.7	Adygei	2.6
Osset	11.6	Abkhaz	2.2
Mordvinia	10.7	Tuva	1.9
Buryat	9.0	Kalmyk	1.8
Udmurt	6.1	Ingush	1.6
Yakut	4.9	Karelia	1.4
Kabardin	4.5	Balkan	1.2
Komi	4.2		

Specialists with higher education employed
in the national economy of the USSR, mid-November, 1966

Nationality	Specialists (in thousands)	Percentage of women	Nationality	Specialists (in thousands)	Percentage of women
Russian	3 091.6	62	Mordvinian	9.0	54
Ukrainian	778.2	56	Komi	6.2	70
Jewish	327.8	50	Udmurt	6.4	63
Belorussian	148.0	58	Buryat	8.1	57
Georgian	121.9	50	Yakut	5.6	48
Armenian	100.5	47	Mari	4.3	51
Uzbek	88.7	29	Kabardinian	3.4	47
Tatar	77.2	65	Karelian	2.0	64
Azerbaijani	63.5	33	Karakalpak	3.1	19
Kazakh	63.4	38	Adygei	2.2	47
Lithuanian	48.1	60	Karasaev	2.5	41
Latvian	34.8	61	Chechen	1.7	24
Estonian	27.6	59	Tuvan	1.9	57
Moldavian	20.5	53	Kalmyk	1.4	54
Chuvash	18.2	50	Abkhaz	1.9	53
Tadzhik	19.4	20	Altai	1.2	47
Daghestanian	13.4	31	Khakass	0.9	59
Turkmenian	17.2	21	Balkan	0.8	41
Khirgiz	16.9	30	Ingush	0.8	29
Bashkirian	11.8	52	Circassian	0.9	45
Osset	13.4	54	TOTAL	5 226.9	58

USSR

5

Estimating the annual budget requirements of the educational system

prepared by Vasilii Ivanovich Basov

This case study was prepared at the request of the IIEP by Vasilii Ivanovich Basov, Deputy Head of the Planning and Financial Department of the Ministry of primary and secondary education of the USSR.

Introduction

One of the most important tasks facing the Soviet state is to raise the general educational level of its people.

This case study is concerned with the techniques used by the Soviet government to: (a) estimate the total financial requirements of the educational system in a particular year; (b) allocate these resources between individual institutions; and (c) control and check the expenditure of individual schools.

The final part of the case study deals with the question of the efficiency of the use of financial resources in the educational system and suggests some ways of increasing educational efficiency in the Soviet Union.

Before turning to the question of techniques for planning future levels of educational expenditure, preparing budget estimates, and allocating resources between individual schools, we will give a very brief review of the development of the educational system in the Soviet Union, the pattern of expenditure and sources of finance.

I. Background information

A. The educational system

There has been a very rapid expansion of education in the Soviet Union since the October Revolution. One of the first steps taken by the Soviet government was to mount a massive campaign against illiteracy and to introduce free schooling. In 1930 the Soviet Union introduced universal compulsory elementary education; a seven-year compulsory system was introduced in 1949 and an eight-year system in 1959. In accordance with the decision of the Twenty-third Congress of the Communist Party of the Soviet Union, the present policy is directed towards attainment of universal secondary education. As a result of the measures taken, the USSR has become a completely literate country. Even as early as 1968 about 82 per cent of the pupils completing the eighth grade went on with their training in various establishments providing secondary education. Nowadays more than 56 per cent of the working population possess a higher and secondary (complete or incomplete) education. More than seventy-seven million people are receiving education in all types of institutions, including over forty-nine million in general schools, four and a half million in higher educational establishments, and 4.3 million in specialized secondary educational establishments.

Table 1 summarizes the expansion of the educational system in the last fifty years. Between 1918 and 1967 about 92,000 schools were constructed, with 28.3 million places.

Educational cost analysis in action: case studies for planners

TABLE 1. Number of general schools of all types, pupils and teachers (at the start of the scholastic year, in thousands)

	1914/15	1940/41	1950/51	1960/61	1965/66	1967/68
Number of schools	124	199	222	224	214	206
Number of pupils	9 656	35 552	34 752	36 187	48 255	48 902
Including:						
Classes I-IV	9 031	21 731	20 120	18 747	20 390	21 101
Classes I-VIII	523	12 530	13 724	14 843	19 879	20 343
Classes IX-X(XI)	102	1 291	908	2 597	7 986	7 458
Number of teachers	280	1 238	1 475	2 043	2 497	2 563

At the start of the scholastic year 1967/68 there were 206,000 schools in the Soviet Union, more than 50 per cent of them being eight-year and secondary schools.

Under the present five-year plan it is intended to introduce in principle universal secondary education. During this plan period there will be four times more pupils in secondary education than during the previous five years. More than 22,000 new schools will be constructed. The number of pupils studying in classes IX-XI will significantly increase.

Supplying highly qualified teachers to the schools is one of the decisive factors for the successful introduction of compulsory eight-year education and the transition to universal secondary education. In 1967/68 the teaching force consisted of almost 2.6 million teachers and the past seven years have seen a rapid increase in the number and level of qualifications of teachers, but future expansion and improvement of education will require still further increases in the number of teachers and improvements in the quality of the teaching force. The qualifications of teachers in 1967/68 are shown in table 2.

TABLE 2. Level of qualification of teachers in general schools (at the beginning of the scholastic year 1967/68, in percentages).

	All teachers	Including		
		Classes I-IV	Classes V-X(XI)	Music, singing, physical culture
All teachers	100.0	100.0	100.0	100.0
Including (a) Education:				
Higher	45.0	10.0	69.1	18.8
Incomplete higher	13.2	7.9	18.9	7.6
Secondary teaching	32.1	74.6	7.4	27.7
Secondary specialist and secondary general	8.5	7.3	4.5	36.1
Without complete secondary education	1.2	0.2	0.1	9.8
(b) Length of teaching service:				
Less than 5 years	21.6	20.6	22.9	34.8
More than 25 years	15.5	18.8	12.4	7.1

The basic type of school in the Soviet Union is the general day school, for children of school age (7 to 17 years). Schools may be organized as primary schools (classes I to IV); eight-year schools (classes I to VIII); or secondary (up to class X). The number of pupils in such general day schools is now over 44.5 million.

In addition there are a number of extended day schools for pupils whose parents both go out to work. In 1969 about five million pupils were taught in such schools, where they were supervised by teachers throughout the day in such activities as domestic work and recreation as well as purely educational activities. There are also a number of boarding schools for orphans or children from large families. About 900,000 pupils attend boarding schools. About 300,000 pupils also attend special schools for handicapped children.

For young people at work the main way of completing their education is provided by evening schools and correspondence courses. This enables those who were unable to complete eight-year or secondary school courses to continue their education. About 4 to 4.5 million young factory and collective farm workers study in these schools annually.

Finally there are a number of institutions for out-of-school activities for pupils in general education, offering facilities for art, music, sport, etc.

B. Trends in educational expenditure and sources of finance

Table 3 summarizes the growth of expenditure on education since 1940 and shows educational expenditure as a proportion of national income and the total government budget. Table 4 shows the sources of finances for this expenditure.

TABLE 3. Expenditures on education and their proportion of the national revenue and budget (in '000 million roubles and in percentages)

	1940	1950	1960	1965	1966	1967
National revenue	33.3	54.7	145.0	193.5	207.4	224.6
<i>Prosveshchenie</i> ¹	2.7	7.3	13.6	23.0	25.0	27.5
Percentage of national revenue	8.1	13.3	9.4	11.9	12.0	12.2
<i>Obrazovanie</i> ²	2.0	5.4	8.5	14.1	15.3	16.2
Percentage	6.0	9.9	5.9	7.3	7.4	7.2
Total national budget expenses	17.4	41.3	73.1	101.6	105.6	115.2
Budgeted <i>prosveshchenie</i>	2.3	5.7	10.3	17.5	18.7	20.1
Percentage of national budget	13.2	13.8	14.1	17.2	17.7	17.4
Budgeted <i>obrazovanie</i>	1.9	4.8	7.4	12.4	13.3	14.0
Percentage of national budget	10.9	11.6	10.1	12.2	12.6	12.2

1. Education, science, culture and information.

2. General education, special secondary, occupational and technical training, higher upgrading courses for teachers.

TABLE 4. Sources of finance on education (in '000 million roubles and in percentages)

	1940	1950	1960	1965	1966	1967
Total expenditure	2.0	5.4	8.5	14.1	15.3	16.2
Including:						
National budget	1.9	4.8	7.4	12.4	13.3	14.0
Percentage	95	89	87	88	87	86
Other sources	0.1	0.6	1.1	1.7	2.0	2.2
Percentage	5	11	13	12	13	14

This table shows that the proportion of general educational expenditure has fallen since 1940, which reflects the increase in the resources of industrial undertakings devoted to education, for instance to finance evening courses for young people at work, or to provide scholarships for workers who go to federal educational institutions.

The biggest item of expenditure is the running costs of schools, particularly salary costs. However, in recent years there has been an increase in the proportion of expenditure devoted to capital expenditure and the purchase of equipment. This is shown in table 5.

TABLE 5. Expenditure on education, science and others, under basic headings, in state budgets of Union Republics (in millions of roubles)

	1950	1955	1960	1965
Total	3 730	4 421	8 080	12 777
Including:				
Wages and salaries	2 124	2 610	3 790	6 769
Extras on wages and salaries	117	147	203	541
Stationery and domestic expenditure	275	342	572	797
Teaching expenditure	95	128	290	329
Stipends	188	299	557	689
Catering expenditure	260	131	394	558
Acquisition of soft furnishings	95	65	236	240
Overall repair	132	165	334	447
Acquisition of equipment	90	79	285	306
Capital investment	67	124	726	941

C. Educational planning in the Soviet Union

The preparation of national plans for education constitutes a basic element in the over-all planning of economic development. Educational planning is concerned with such issues as: (i) the provision of universal compulsory eight-year schooling, and the introduction of universal secondary education; (ii) improvements in the

quality of teaching; (iii) an increase in the number of schools in the light of population increases and the needs of economic and regional development; (iv) improvements in the supply of teaching aids.

Estimates of requirements for each level of education are made every year in the light of estimates of finance available in the coming year and a review of existing standards. The preparation of financial estimates for the educational plan is based on the application of quantitative and monetary norms, together with detailed estimates of the number of classes and pupils, the number of pupils in each class, the effects of the operation of a 'shift system' in schools, and the intake and output of pupils.

These estimates take into account projections of the total population, its age structure and its distribution between regions. At the secondary level the estimates also take into account the types of secondary education provided outside the formal school structure, and estimates of manpower requirement for each economic region and for the country as a whole.

A very crucial stage in the preparation of budget estimates is the application of physical and monetary norms. The next section examines the definition and application of these norms in planning general elementary and secondary education.

II. The use of norms in the preparation of budget estimates for general education

A. Definition of norms

In the Soviet Union 'norms' are used in educational planning for two purposes:

(i) the preparation of budget estimates; (ii) the control and checking of expenditure.

This requires a large number of norms, applicable to different types of expenditure.

Separate norms are laid down for each separate item of expenditure as shown in the state budgets, for example:

- (a) wages and salaries;
- (b) books and stationery;
- (c) administration and travel;
- (d) equipment and furniture;
- (e) repair of buildings and equipment;
- (f) food and medical expenditure;
- (g) scholarships;
- (h) capital expenditure.

Two different types of norms are laid down by the planning authorities. Firstly *physical*, or *material* norms, which are expressed in physical units, such as quantity of fuel or electricity for heating or lighting purposes; and secondly, *financial*, and

budgetary norms, expressed in monetary terms. Physical norms provide a basis for ensuring standardization between different institutions and for ensuring a uniform quality and satisfaction of requirements. They represent standards of relatively constant value, and are determined where possible on the basis of scientifically determined standards, for instance of heating, lighting requirements, etc. Thus physical norms will not vary between regions. On the other hand, 'financial' norms, which represent the translation of physical norms into monetary terms, differ according to regions and reflect differences in prices and regional transportation tariffs, and so on. Finally, 'budgetary' norms reflect the proportion of total expenditure that is met from budgetary sources. In most cases budgetary norms are identical with financial norms, but differences may arise in institutions which are partly financed by non-budgetary sources.

The financial and budgetary norms are used both to determine expenditure for individual establishments and for over-all planning. However, as a rule material norms are used only to draw up individual estimates for establishments.

Norms may be expressed as 'individual' norms, corresponding to individual items of expenditure, for example heating, lighting, water supply, or 'combined' norms, which group together a number of individual norms, for instance domestic expenditure, which includes cleaning, repairs, and maintenance, as well as heating, lighting, etc. For some purposes a number of combined norms may be grouped together to show, for example, the total cost of maintaining a classroom in school.

Estimates for establishments are drawn up on the basis of individual norms. In some cases individual norms are also used for over-all planning, in cases where combined norms must be made more precise due to changes in prices or basic rates of wages and salaries and amounts of grants to pupils. However, combined norms are mainly used when drawing up over-all plans.

Financial norms may be expressed in terms of expenditure per day, month or year. Norms for items such as heating, lighting, furniture and equipment are expressed in terms of annual expenditure; norms for wages and salaries or amount of stipend are expressed in terms of monthly rates, whereas norms for food and medical provisions are expressed in terms of daily expenditure.

A further distinction must be made between 'compulsory' norms and 'calculated' norms, used simply for calculating purposes. Compulsory expenditure norms, for example relating to wages and salaries, are established by the Union government and the governments of the Union Republics, ministries and authorities, and also by the executive committees of the local Councils of Workers' deputies. Basic wage and salary rates are laid down on the basis of teacher qualifications and length of experience and apply throughout each republic and the country as a whole. On the other hand 'calculated' norms, which are not compulsory and are used simply as information, reflect *mean* (average) monetary outlay per costing unit (such as classroom, pupil, square metre, etc.) in different regions or districts in the light of local conditions, prices, etc. Mean norms are used both in drawing up estimates and in the over-all planning of establishments. The norms are most widely used for the preparation of over-all plans.

B. The justification and purpose of norms

In many cases the calculation of norms presents considerable problems; for example, it is extremely difficult to establish a norm for domestic expenses, including heating, lighting, etc., which vary according to the location and type of school building and local characteristics. For such expenses it is impossible to set up a uniform material or monetary norm on a scale suitable for the whole country or each union republic. At first, therefore, the majority of establishments refrained from any standardization of domestic expenses, the greater part of the estimated costing being performed on the basis of actual outlay during the preceding year.

This raises the question of why Soviet planners do not use actual outlays in previous years to make cost estimates and allocate resources, rather than physical or financial norms. The method of using norms has been adopted because of the belief that actual expenditure does not always correctly reflect an establishment's requirements. Actual expenditure may include a certain amount of non-productive outlay. For instance, in some establishments there may have been no economy in outlay on electric power, fuel or stationery. If the plan is based on actual expenditure, therefore, future expenditure on these items will simply perpetuate such inefficient use of funds.

Experience showed that planning of expenditure without the use of norms might even contribute to irrational and uneconomic levels of expenditure. Since they were aware that expenditure was planned on the basis of actual previous expenditure, heads of establishments endeavoured to use up in full all funds provided for each item in the estimate, even if there was no need for such expenditure. Moreover, if expenditure was determined in this way, identical requirements were unevenly met in the same type of establishment. From year to year individual establishments received increased allocations, while others went short.

To obviate these defects, uniform material norms per costing unit have been worked out for domestic expenditure on the basis of individual districts and large cities. The selection of costing units is very important for the preparation of such norms. Such selection greatly influences the correct determination of costs and the distribution of resources between the individual economic regions.

The Twentieth Congress of the Communist Party of the Soviet Union called for a general principle, based on objective indices, for determining the distribution of budget resources to all republics. Certain economists suggested mean *per capita* expenditure as an index. However, an analysis of expenditure on individual establishments shows that the level of such expenditure depends upon many factors: density of population; its age structure; the geography of the locality; climatic conditions; level of education, etc. For this reason, in planning outlay on national education *per capita* expenditure would not enable financial resources to be correctly distributed between individual republics, districts, cities and regions. For the further improvement of the methods of planning expenditure on education it was acknowledged to be advisable to plan allocations for individual purposes on the basis of the indices reflec-

ting the scope of activity of establishments and the factors determining the amount of expenditure.

It is impossible to determine for all expenditure any single or all-purpose costing unit. In the estimates for individual establishments, therefore, the norms of expenditure for wages and salaries and official journeys and missions are drawn up in relation to one worker; the sustenance norms are drawn up in relation to one pupil; the norms for teaching expenses are drawn up in relation to each class or pupil; the norms of outlay on stipends relate to each pupil; the norms of heating costs are related to one cubic metre of space inside the building; the norms for lighting costs are related to one lighting point or one square metre of the area of the premises; the norms for expenditure on cleaning the building, yard and street and other domestic expenses are related to one cubic metre of the area of the premises, etc.

To sum up, Soviet planning authorities believe that the use of norms rather than previous levels of expenditure for estimating future expenditure will achieve two objectives, namely: to satisfy requirements as fully as possible at a given stage; and to make the most rational and economic use of material and monetary resources.

The following section examines the application of these norms in the preparation of the total educational budget and in estimating expenditure of individual institutions.

C. The application of norms in preparing budgets for general education

The general education budget is a document determining the total amount and method of application of funds devoted to the development of primary, eight-year and secondary general education. The state budget determines the allocation of funds between the following types of national educational establishments: general day schools; extended day schools and groups; boarding departments in schools; schools for young people at work; and establishments and undertakings for extra-curricular work for school pupils.

Expenditure on general day schools (primary, eight-year and secondary) represents the largest single item in the budget for general education. Table 6 shows the distribution of expenditure on primary, eight-year and secondary schools, and the mean expenditure per pupil, between 1950 and 1965. Table 7 gives the same data for the USSR as a whole.

The basic method of budget planning is to determine the amount of outlay strictly in accordance with the national economic plan, observing the monetary norms laid down in the plan, and state prices and tariffs. The planning of expenditure for schools is based on two different methods:

1. Direct calculation of the requirements of schools and other general educational establishments on the basis of material and monetary norms, state prices and tariffs, basic rates of wages and salaries and authorized schedules. This method is mainly used when drawing up individual estimates for national education establishments.

5. USSR: II

TABLE 6. Expenditure on primary, eight-year and secondary schools according to basic types of expenditure in the state budgets of the Union Republics, and mean expenditure per pupil (in million roubles)

	1950	1955	1960	1965
Total	1 938	2 324	2 990	5 095
Including:				
Wages and salaries	1 515	1 786	2 018	3 581
Allowances on wages and salaries	87	107	118	203
Stationery and domestic expenses	150	188	248	369
Teaching costs	26	31	44	82
Grants paid to pupils	0.7	0.2	0.3	3.3
Catering expenses	2.8	1.4	4.2	4.6
Obtaining soft furnishings	1.8	0.8	1.5	1.7
Overall repairs	67	96	162	241
Obtaining equipment	38	32	87	105
Capital investments	40	71	285	386
Mean expenditure per pupil ¹ (in roubles)	61	78	99	128

1. Capital + current.

TABLE 7. Expenditure of Soviet state budget on general education (in millions of roubles and in percentages)

	1940	1950	1960	1965
Total expenditure	1 187	3 040	5 002	8 936
Including:				
Primary, incomplete secondary and secondary schools	886	2 012	3 094	5 181
Percentage	74.7	66.2	61.9	50.0
Boarding schools	—	—	411	683
Percentage	—	—	8.2	7.6
Evening schools, etc.	1	62	168	317
Percentage	0.1	2.0	3.6	3.5
Boarders at school	15	49	124	193
Percentage	1.3	1.6	2.5	2.2
Special boarding schools and children's homes	99	488	305	369
Percentage	8.3	16.5	6.1	4.1
Out-of-school establishments and purposes	23	38	102	163
Percentage	1.9	1.2	2.0	1.8

2. In over-all planning outlay is mainly calculated by the application of *mean norms* drawn up per costing unit. This method differs from the direct calculation method because the former is based on amalgamated yardsticks. There is therefore a great difference between the drawing-up of expenditure estimates for individual establishments, and that for purposes of over-all planning, even though similar general principles apply.

The main requirement in determining total outlay on general education is data concerning the numbers and distribution of schools at the beginning and end of a planning year, and the mean annual number of schools. These indices form the basis for calculating the total amount of finance for the coming year and are determined on the basis of statistical data for the previous period, an assessment of expected performance up to the end of the current year, and the targets laid down in the National economic plan. The National economic plan determines the number of pupils and classes in primary, incomplete secondary and secondary schools and the number of pupils in schools for young people at work and living in rural areas, the number taking correspondence courses, and the number of pupils in boarding schools.

When determining the number of establishments and their distribution between the individual territorial units of the country, attention is given to the greatest growth in the more backward regions, districts and republics with the object of drawing them to a common level.

During the year the number of general education establishments does not remain constant; to take account of this, expenditure is determined on the basis of mean annual indices calculated according to the following formula:

$$K_c = \left(\frac{M_1}{12} \times K_1 + \frac{M_2}{12} K_2 + \frac{M_3}{12} K_3 \text{ etc.} \right), \text{ where}$$

K_c = mean annual number of establishments;

K_1 = number of establishments at start of planning year;

M_1 = number of months for which the transitional number of establishments functions;

$K_2 K_3$ etc. = numbers of establishments after change (increase or decrease);

$M_2 M_3$ etc. = number of months of operation of new numbers of establishments until their subsequent change.

Alternatively, a formula can be used which simply measures the increase in the number of establishments during the planning year:

$$K_c = K_1 + \frac{M_1}{12} \times \pi_1 + \frac{M_2}{12} \times \pi_2 \text{ etc., where}$$

K_c = mean annual number of establishments;

K_1 = number of establishments at the start of the planning year;

$\pi_1 \pi_2$ etc. = change in numbers of establishments, (increase or decrease);

$M_1 M_2$ etc. = number of months of operation of each addition until the end of the year.

These formulae are used when preparing individual estimates for establishments and also for the overall planning of total expenditure on general schools, schools for young people at work, etc.

In drawing up over-all budget estimates for general education, the planning authorities use these estimates of the total number of pupils, classes and schools, together with physical or financial norms. For example, the estimate of teachers' wages and salaries is calculated on the basis of the prescribed number of hours' teaching per class (for example, twenty-four hours per week for classes I to IV and eighteen hours per week for classes V to X), norms of teachers' workloads, and the basic rates of teachers' pay, according to qualifications and length of teaching experience, as laid down by the Soviet government. In over-all planning, annual average salary is used as a basis for calculation. In recent years the mean basic rate increased annually by 1 to 1.5 per cent, mainly due to improvement in the quality of the teachers.

In order to estimate other items of expenditure, the planning authorities apply mean norms expressed in terms of expenditure per pupil or expenditure per class. For example, when determining the funds for the salaries of other school personnel, the mean outlay per class as a whole is first calculated, and its distribution over individual groups of classes is then determined, taking as a basis the proportion of teachers' salaries. This breakdown is needed to enable the total mean outlay per class and per pupil to be determined for each group of classes. The planning of teaching and other costs is carried out on the basis of fixed monetary norms determined for one class.

The estimation of expenditure on schools other than general day schools, such as extended day schools (for pupils whose parents both go out to work) or boarding schools, is based on a calculation of the additional expenditure of these types of school, again using mean per-pupil norms. For example, additional administrative, assistant teacher and ancillary staff are required for extended day schools, such as nurses, storekeepers, cooks, washers-up, etc. For out-of-school work with children in extended day schools and groups, teachers are provided on the basis of 1.5 units per group of pupils in classes I-IV and 1 unit per group of pupils in classes V-VIII, reckoning the number of pupils in each group as thirty to forty. In over-all planning, outlay on wages and salaries for such extra personnel is determined by the mean cost per pupil, such cost being determined in accordance with the plan for the current year, allowing for changes over a number of years. Similarly, the costs of boarding departments in schools are calculated in accordance with norms for one pupil. Boarding departments are set up for those pupils in general schools who live in rural areas more than three kilometres from the school. These boarding establishments can be divided into two categories: mass boarding schools, which are financed from a combination of sources, including contributions from parents, industrial enterprises and collective farms; and fully state-supported boarding schools, maintained completely from state funds, and intended for pupils in the far north and adjoining regions.

In over-all planning, outlay on boarding schools is determined according to norms for one pupil (distinguishing between boarders and non-boarders).

This is due to the fact that about 75 per cent of the outlay for each current establishment (costs of sustenance, obtaining of equipment, furnishings and uniforms, teaching and other costs, etc.) depends on the number of pupils.

TABLE 8. Costs of boarding schools by basic items of expenditure in state budgets of Union Republics (in millions of roubles)

	1960	1965
Total	397.0	652.0
Including:		
Wages and salaries	77.4	208.0
Allowances on wages and salaries	4.5	12.0
Stationery and domestic expenses	37.1	82.0
Teaching costs	5.8	10.1
Catering expenses	81.6	198.0
Obtaining soft furnishings	79.9	88.3
Overall repairs	15.4	21.3
Obtaining equipment	16.5	10.8
Capital investments	75.5	20.1
Mean outlay per pupil (in roubles)	648	660

Costs of meals in boarding schools are determined in accordance with established norms, allowing for the number of days during which one pupil receives meals during the year, such days having been reduced in recent years because with each year a progressively larger number of pupils go away during the vacation and also on free days and holidays. All other costs, including domestic costs, soft furnishings and teaching aids, are calculated on the basis of fixed or mean norms per pupil.

The planning of total expenditure on equipment and furnishings, and also over-all repairs, has a number of special features. In over-all planning these items of expenditure are determined by individual monetary norms and are distributed amongst the individual general educational establishments in the light of the actual needs of each establishment, within the limits of the total amount of resources available in each city or region.

For instance, when deciding on the distribution of funds for equipment or furnishings, the extent to which establishments are already supplied with such articles is taken into account. If an examination of the estimates shows a large discrepancy in the supplies of equipment possessed by different establishments, funds are redistributed by stabilizing the expenditure of the establishments which have already achieved the required level and increasing the allocations to establishments which show lower indices.

In practice, in some republics a complex method of supplying establishments with equipment and furnishings has been adopted. Resources earmarked for obtaining equipment and furnishings are not dispersed over all establishments, but are distributed amongst those which have the greatest need. This way of distributing resources has a very positive importance since it creates the preliminary conditions for the periodic replacement of obsolete equipment and furnishings,

enables the requirements of establishments to be evenly satisfied and considerably reduces the costs of transportation and acquisition.

A similar approach is adopted for the distribution of allocations for the over-all repair of buildings. As a rule, over-all repairs to buildings are carried out only once every few years. For this reason there would be no point in distributing resources marked out for over-all repairs amongst all establishments. They are conferred only on establishments which require over-all repairs. To this end the national education departments of the executive committees of local Councils of Workers' deputies keep a record of the state of the buildings which they own, indicating the dates and cost of over-all repairs.

The budget shows capital investment for the construction of national education establishments in accordance with the indices of the national economic plan, on the basis of the growth of their network and the mean building cost per pupil-place; in 1968 the mean cost was 500 roubles, and about one million pupil-places were provided by state capital investments.

In recent years decentralized sources of financing have become very important as a means of financing school buildings. The over-all estimates for new industrial undertakings and officially-built residential areas show special allocations from capital investment for the building of general schools. Industrial, agricultural and other undertakings and organizations are permitted to spend accumulations over and above their plan for the construction and equipment of schools. Many have also been built on the initiative of the collective farms. Every year an average of 500,000 pupil-places are built at the expense of collective farms.

The aims of the immediate future are to abolish second-shift studies, to provide all schools with standard properly equipped premises and to create the most favourable conditions for carrying out the teaching process and the work of study circles and to give healthy relaxation to school pupils.

D. The use of norms in the estimation of budgets for individual educational institutions

The estimate of any establishment is a document showing the volume of work of the establishment and setting forth future items of expenditure, itemizing the total outlay. The estimate for each separate establishment (school, boarding school or out-of-school establishment) is called an individual estimate, since it reflects the peculiar features of that establishment's activities. Nevertheless, individual estimates have a uniform financial structure and they all consist of three parts.

The first part contains general details about the establishment and states the basic facts concerning its work; the general information, for example, includes the cubic capacity of all the buildings and their internal area. In addition the document gives basic facts determining the volume of work of the establishment and the planned extension of its activities, for instance, details concerning the number of classes and pupils and the basic salary rates for teachers.

The second part gives detailed calculations for each item of expenditure. The calculations include all the sums required individually for each type of outlay: for wages and salaries; teaching costs; costs of meals; equipment and furnishings; etc. Estimates for the current year are compared with the funds allocated in the previous year, and with details about the actual use of resources, such as heating and lighting equipment, during the previous year.

The third part of the estimate contains a quarterly itemized total of expenditure. It summarizes in monetary terms all the necessary outlay for the maintenance of the establishment during the coming year, showing the relative importance of each item, and the increase in expenditure on each item since the previous year.

The estimate is therefore a document determining the amount, over-all assignment and quarterly distribution of resources contributed from the budget to the upkeep of an establishment and the extension of its activities. The estimate is very important both for drawing up plans for financing general education establishments and for the allocation of budget resources. The estimate is used to determine an establishment's financial needs, and the justification of expenditure is based on the calculations of the estimate.

The total expenditure of budget resources is determined by strictly defining costs in the estimate by types of expenditure with a top and bottom limit for each item. The total allocations are distributed quarterly, thus facilitating the planning of expenditure of state resources during the course of the year. General educational establishments are prohibited from incurring any expenses over and above the confirmed estimate. In this way misuse of budget resources is prevented. The individual estimates are used as the basis for drawing up an over-all expenditure plan for the maintenance of general educational establishments by region, district and republic. Nowadays the confirmed estimate is essentially the only document on which is based the financing of establishments and their expenditure of state resources.

The methods for drawing up estimates for general educational establishments are determined by the Soviet Ministry of finances. There have been considerable changes in the types of estimate over a number of years, mainly directed at reducing the number of individual indices, simplifying calculations for a number of headings, and extending the financial responsibility of directors of general educational establishments. Nowadays the Soviet Ministry of finance prepares and issues directives concerning the methods of preparing estimates for each type of school.

The direct calculation method is mainly used for the determination of allocations in the estimates for individual establishments. The largest sums in outlay on general education are paid out on wages and salaries, which in some schools amount to 80 per cent of all current expenditure.

The monthly fund for teachers' salaries is calculated on the basis of the teachers' basic rates and mean salaries. The salaries of administrative personnel are determined on the basis of establishment schedules, drawn up with the help of norms and with reference to their basic wage rates.

Calculation of domestic expenditure is also made on the basis of norms, for

example the cost of heating is calculated by using local norms for fuel consumption per cubic metre and area of floor space, drawn up by the district executive committees of the Councils of Workers' deputies, or by the Soviet state planning authority. Similarly the cost of lighting is calculated from norms per unit of floor space, taking into account the special conditions of the school, such as shift teaching.

Norms are also used to estimate all other items of expenditure; either physical norms are used, expressed in terms of ratios to area, etc., or norms of mean expenditure. Although outlay on stationery and domestic requirements is determined in accordance with established norms, the accounts of such expenditure are systematically checked and made more precise in accordance with the actual use made of such outlay. If the analysis of the accounting documents shows that for a long time there have been considerable deviations from the norms, the norms are revised and allocations are determined on the basis of actual expenditure.

Teaching costs, such as the cost of books, teaching aids and materials, are estimated with reference to norms of expenditure per class or per pupil. Prime importance in the teaching process is attached to technical teaching aids, such as film, radio, television, calculating machines, etc. Lists of teaching equipment require urgent revision, and outlay for such purposes must increase considerably. The Soviet government has therefore adopted a special resolution deciding that the production of teaching aids should be stepped up by not less than 1.5 times during the coming seven years, and the Ministry of primary and secondary education has drawn up a list of teaching equipment suitable for each type of school, taking into account the latest developments on technical teaching aids.

Individual estimates are prepared by the heads of schools and other educational institutions. The estimate is then presented for confirmation to the National education department. This department examines and checks the estimates and ensures that the distribution and numbers of educational establishments correspond with those laid down in the National economic plan.

The Department of national education combines all the approved individual estimates in a summary estimate, including outlay on the maintenance of schools opened during the new scholastic year, centralized expenditure not reflected in the individual estimates, and outlay on out-of-school and other establishments under the control of the department. The total expenditure, as determined by the department, must not exceed the amounts allowed for in the budget draft. If the total amount of expenditure does exceed the limits laid down, the department correspondingly curtails the budget estimates of individual establishments.

The quarterly distribution of the annual allocations according to the estimate is then carried out, taking into account the seasonal nature of individual items of expenditure, and making sure that the total outlay corresponds exactly to the confirmed quarterly breakdown of the budget.

The officials of the Department of national education confirm the individual school estimates, and inform the heads of schools what their budget and salaries fund will be in the coming year. One copy of the confirmed estimate remains with the Department of national education, while another is returned to the school and serves as the basis on which funds are allocated from the budget.

III. The system of control over expenditures of individual educational establishments

Heads of establishments and organizations having the right to dispose of budget resources independently are called managers of credits, either principal managers of credits, or first-grade managers of credits, and third-grade managers of credits. As a rule, local budgets have no second-grade managers.

In the case of district, area, urban and regional budgets, the principal managers of credits are the managers of the departments of the executive committees of the corresponding Councils of Workers' deputies, including the manager of the Department of national education. In rural, settlement and urban budgets (of towns subject to regional control) the principal managers are the chairmen of the executive committees of the corresponding Councils of Workers' deputies.

Principal managers have at their disposal all resources allowed by the budget both for measures carried out directly by the managers themselves and by establishments and organizations under their control. Principal managers of credits have the right:

1. To dispose of budget resources contributed for the maintenance of the administrative apparatus; to cover outlay on centralized measures carried out by themselves and also outlay incurred by those establishments under their authority who do not possess the rights of managers of credits.
2. To receive funds and re-allocate them amongst the organizations under their authority.
3. To examine and confirm the estimates and accounts of the establishments under their authority.
4. To delay transfer of funds to third-grade managers of credits and to recall sums already transferred if financial discipline has been infringed or if there has been delay in the presentation of accounts.

It is the duty of principal managers to keep a check on the financial and economic activities of third-grade managers of credits.

Heads of schools under the control of principal managers are permitted to re-allocate some items of expenditure, provided that the over-all estimate is not exceeded, but no re-allocation of funds for wages and salaries and capital investments is allowed. Re-allocation of funds between institutions can be made only by the committees which originally confirmed the budget estimates. For instance, a manager of the Department of national education can increase the allocations for wages and salaries at one school, by correspondingly reducing such allocations at another school. Principal managers of credits may re-allocate funds between different branches of general education, but once again no re-allocation is permitted of funds for wages, salaries or capital expenditure.

At the request of ministries and authorities, the Soviet Ministry of finances has the right if necessary to increase by 10 per cent the budget allocations allotted to such ministry or authority for that quarter at the expense of allocations for the same purpose for the following quarter— i.e. to transfer allocations from one

quarter to another. In accordance with the legislation of union republics, the ministries of union and autonomous republics and the managers of local financial organizations have similar rights. However, they can use such rights only when there is an excess of revenue over expenditure in the quarter for which allocations have been increased.

A decision by the Council of Ministers, USSR; the Councils of Ministers of Union and Autonomous Republics, and the executive committees of local councils can bring about the following changes:

1. Increase the annual assignments for limited headings of expenditure: wages and salaries; capital investments; costs of obtaining equipment and furnishings, etc., according to the budgets of individual principal managers of credits within the limits of the total sum allocated for these purposes by the budget.
2. Increase the annual allocations for individual sections, subsections and in the over-all estimates of the principal managers of credits, by correspondingly reducing the allocations for other sections, subsections and over-all estimates of the principal managers.
3. Confirm extra expenditure drawn from reserve funds, an excess of revenue over expenditure or a surplus in the revenue part of the budget due to economy in use of resources.

A careful system of checking expenditure accounts is in operation to identify institutions which do not meet the targets laid down in the plan and who therefore have their financial allocation reduced. Others may have unused allocations of funds, due, for example, to teacher vacancies or the existence of surplus materials. This analysis is carried out by the managers of credits on the basis of quarterly accounts, and determines the actual payment of funds in the following quarters.

IV. Approaches to the problem of improving resource utilization in general education

Unfortunately, until recently Soviet economic literature dealt mainly with the economic problems of industry. The neglect of the problems of social and cultural organizations, including educational establishments, partly contributed to the uneconomic, wasteful use of materials and money which has taken place.

After the Plenary Session of the Central Committee of the Communist Party of the Soviet Union, held in September 1965, there has been a sharp change in attitudes towards the economic aspects of national education. Nowadays it is generally recognized that the problem of using resources economically in the administrative sphere has the same social and economic importance as in industry.

The economics of education represent not only a struggle for the rational use of state funds, but also a struggle for the fuller satisfaction of the demands of the

workers—a struggle to obtain better results at reduced cost. A constant effort must be made to find those forms of education, which will be most favourable from the national economic point of view and which will also ensure the economic use of the nation's resources.

Any study of the economic problems of national education must start by determining its efficiency and what importance it has for the nation's economy by raising the general productivity of labour. Soviet economic literature has already thrown some light on this problem. There is no doubt that the education of the nation plays an important part in the creation of the national revenue and in raising the level of the economic and cultural life of the country.

Attempts have been made to calculate the economic efficiency of the educational system, by estimating the contribution to national income made by improvements in the qualifications of workers. In 1960 Strumilin estimated that 23 per cent of the national revenue was attributable to increased educational qualifications of the labour force, and Zhanin made a similar calculation in 1962 which suggested that 27 per cent of the national income could be attributed to investment in education.

Just as it is important to estimate the over-all contribution of education to national income, so it is important to examine the internal efficiency of education, with a view to increasing the effectiveness of every rouble spent.

There are many ways of raising the economic efficiency of national education; enlarging small schools; the rational use of classrooms; observance of the established number of pupils in classes; selection of the optimum teaching periods; abolition of drop-outs and repeaters; the practice of the strictest economy.

The enlargement of small schools, more particularly schools having a small number of staff, is an urgent problem for the national educational organizations. The Soviet press has repeatedly drawn attention to the educational and economic inadvisability of maintaining schools with small staffs. As a rule in such schools the teachers simultaneously teach several classes. The teacher therefore gives each class two to four times less of his teaching time than in an ordinary school. He has to prepare some eight to sixteen lessons every day, and at the same time carry out his administrative and economic duties in the school. In schools with small staffs it is practically impossible to use the latest technical methods in teaching, such as radio, films, television, calculating machines, etc. For fifteen to twenty pupils it is irrational to set up laboratories, workshops and gymnasia.

Of course, all this has a negative effect on the education of the pupils. As a result small schools are often educationally inferior to those with larger staffs. The abolition of schools with small staffs would not only enable the shortage of teachers to be reduced, but would also to some extent give a fuller workload to teachers of special subjects in eight-year and secondary schools, more particularly teachers of singing and physical culture.

The economic aspect of the problem is very important. Although in the lowest grades of eight-year and secondary schools the mean annual cost of teaching one pupil is about fifty roubles, in schools having small staffs this sum fluctuates between 100 and 250 roubles.

In recent years the national education organizations have done some work on enlarging small schools, with certain positive results. The number of primary schools has been curtailed by almost 25,000 compared to the scholastic year 1958/59. The result has been to release about sixty-five million roubles, but far from enough has been done.

The load on the primary schools is extremely low. In the scholastic year 1968/69 each primary school had an average of forty-one pupils, as compared with seventy-seven pupils in the scholastic year 1940/41. Out of the total number of primary schools in the RSFSR, 6 per cent of the schools have up to ten pupils, 12 per cent have ten to fifteen pupils, 13 per cent have sixteen to twenty pupils, 24 per cent have twenty-one to thirty pupils and 16 per cent have thirty-one to forty pupils—i.e. the number of pupils does not exceed forty in 71 per cent of the primary schools.

Work on the abolition of schools with small staffs must be carried out carefully, on the basis of a previously prepared plan, taking into account the peculiar features of each area, city or region. Small schools must not be enlarged simply by overcrowding classes or by increasing use of the shift system; the proper expansion of small schools requires the building of adequate premises, either by extending existing schools or by building new schools. Since 1965 a policy of extending schools has been adopted, financed by the saving of resources due to better utilization of staff and also out of allocations for general repairs and excess budget revenue. This policy, rather than one of building new schools, has been adopted because the development of new schools is carefully planned so as to synchronize with regional economic development, which means that funds are not always available to finance a new school in a relatively unpopulated area.

In many instances the availability of free classroom space is no confirmation that all the necessary conditions are already present for the abolition of schools with small staffs. It is not enough when pupils live at distances of three kilometres and more from the school. Normal teaching conditions must also be ensured for the pupils in such schools.

A problem of prime importance is to organize the regular transportation of pupils in rural schools. A directive issued by the Praesidium of the Supreme Soviet ordered the free transportation of pupils to and from their homes and schools in rural areas from the scholastic year 1965/66 onwards. An approximate calculation shows that the state spends an annual total of about thirty million roubles on the implementation of this directive.

The introduction of universal secondary education in rural areas, the implementation of steps for the rationalization of the school network and the abolition of schools with small staffs will be impossible unless there is a considerable further increase in the development of boarding departments in schools. The Central Committee of the Communist Party of the Soviet Union and the Council of Ministers, USSR, therefore decided that in rural areas eight-year and secondary schools should as a rule be constructed with boarding departments for pupils living in residential areas a long way from the school and that resources should be specially devoted to this end from the total allocations for housing construction.

There is no doubt that the adding of classrooms, the organization of transport-

ation for the pupils and the development of boarding departments will create the effective possibility of enlarging small schools. This in its turn will lead to a considerable improvement in the quality of teaching, the rational use of teachers, laboratories, workshops and gymnasia and the more efficient use of monetary resources.

One of the important problems in the economics of education is to find ways of using school premises rationally.

The rational use of classrooms mainly depends on the number of pupils in the class. The norm for the number of pupils in classes I-VIII of general schools is forty, and for classes IX-XI it is thirty-five. For evening schools (in shifts), the number of pupils in a class is established as twenty to twenty-five. However, the actual number of pupils in classes in the schools is considerably lower than the established number. For instance, in the RSFSR in the scholastic year 1968/69 the average number in urban schools was thirty-four and in rural schools twenty-three, while in schools for young people at work and in schools for young people in rural areas the figures were twenty-two and seventeen respectively. There are some schools in which the number of pupils in a class does not exceed five or ten. The average number of pupils in classes in 1968 had gone down from thirty to twenty-eight in comparison with 1940.

A small number of pupils in classes not only has an adverse effect on the rational use of school premises, but it also limits the possibility of abolishing the shift system and extending extra-curricular work with the pupils, and considerably increases costs. For instance, to increase or reduce the mean number of pupils in a class by one pupil represents seventeen million roubles per annum.

Therefore, how to increase the average number of pupils in classes presents an important problem, although the average size of class should not be permitted to increase to forty-five or fifty pupils per class. However, increasing the average size of classes must not be seen as a short-term campaign, since it requires careful preparatory work.

At present about 70 per cent of the schools work in one shift. However, this means that about 800,000 classrooms are free after school hours. The problem of using school premises rationally will become even more acute when all schools turn over to single shift working. We must immediately consider how to make the best use of this space.

Practical experience has shown certain ways of making effective use of classrooms. For instance, as a rule schools for young people out at work and those in rural areas and also correspondence schools, are set up in general schools for children. According to existing data, these schools use about 200,000 classrooms. The extended-day groups are even more important. In the scholastic year 1968/69 they had about 250,000 classrooms. This demonstrates that if all classrooms are to be fully utilized, other ways of using the classrooms must be found, for example expansion of out-of-school activities.

The efficient utilization of school buildings therefore represents one way of increasing the efficiency with which scarce resources are used in education. Other

ways also exist, for instance, improvements in the domestic administration of schools.

An interesting experiment has been carried out by the Moldavian Soviet Socialist Republic in setting up groups for centralized domestic administration and calculating the expenditure for the maintenance of general schools in rural areas. The setting up by the Department for national education of a special organization dealing with supplies of materials and technical equipment to the schools has fully justified itself. The schools have been relieved of functions not directly educational, their domestic administration has been considerably improved, calculation and accounting has become more accurate, and resources are being used more economically.

Such savings represent considerable improvements in the efficient utilization of state funds. Given the recent enormous growth in expenditure on national education, even a slight economy saves millions of roubles.

It is nowadays generally recognized that the head of an educational establishment must not only be well acquainted with pedagogics and teaching methods, but must also be able to deal with the economic problems of education. For this reason a special course on economics and organization must be introduced into specialized higher and secondary teacher-training establishments. The Academy of pedagogic sciences, USSR, is setting up a scientific research centre for studying the organizational, educational and economic problems of raising the general educational level of the population.

There can be no doubt that the greater attention given by educationalists, economists and teachers to the economics of education will have a favourable effect on the quality of instruction given to the pupils and on the more efficient use of state funds.

France

6

The use of capital costs
in educational planning —
the case of the fifth French plan

prepared by Claude Tibi

The study was prepared by Mr. C. Tibi, IIEP staff member; the Director of the Institute, Mr. R. Poignant, who was rapporteur of the *Commission de l'Equipement scolaire, universitaire et sportif* of the third and fourth French plans, served as principal adviser. It was possible to undertake this study thanks to the helpful co-operation of the French authorities, who made available to the Institute documents and official reports on the fifth plan.

Introduction

Purpose of this study

The methodology analysed in this case study is that used by the Committee on school, university and sport equipment (CESUS) to evaluate the capital outlay required to achieve the development targets of the Fifth French educational plan (1966-71). The study will be limited to showing how the costs were computed and used in the preparation of the educational plan. We shall endeavour to demonstrate their importance in planning and to determine to what extent the methods used are of general application, although that will obviously depend on the context in which the planning is carried out and on the volume of statistical data available.

We shall examine, on the one hand, the norms of occupation, floor space and equipment adopted by the committee and, on the other, the various components of the costs and the factors which were considered to have a significant effect on costs.

We shall then show how these figures were used to determine the investment requirements. The method of evaluating the requirements will be the subject of a special analysis. Lastly, since the request for funds are not usually fully met, we shall examine the procedures used by the committee to distribute the total amount actually allocated among the different types and levels of education. That part of the study will be followed by a critical analysis of the *methods* adopted.

General status of planning in France

Let us briefly describe the general structure of economic and social planning in France, and outline that part of it which concerns education.

The planning agency is the General planning commission. When a plan is being prepared, the commission first drafts a general outline in order to determine rates of growth, and to clarify the major issues and basic options involved. Detailed specification by sectors is then entrusted to specialized committees which prepare recommendations defining the targets and the means of attaining them, in particular the amount of public funds to be provided for each sector. A first government arbitration then follows (later to be submitted to a vote in parliament), and an indication of the maximum and minimum amounts of funds which may be allocated by sectors is returned to the committees. The committees make the corresponding changes in the recommendations, and a second arbitration at ministerial level settles the definite amounts of the appropriations, enabling the committees to prepare final reports. The plan then becomes official by Act of parliament.

Questions relating to national education are examined by CESUS whose mission consists, first of all, in setting the targets for the development of the educational sector, taking into account all the pedagogical,¹ social, economic

1. The pedagogical factors are an object of special study on the part of the Ministry of education.

and demographic factors involved, and then in determining the necessary ways and means, in particular the amount of public funds which will be required.

It should be pointed out that the task of forecasting how and when the funds will be required is not assigned to this committee but to an autonomous inter-ministerial working group. Moreover, the qualitative data of the plan (structure of educational buildings and consequences of pedagogical reforms, for example) are communicated to the committee by the Ministry of education but are not subject to discussion by the committee.

The work done by the committee bears on the following problems: forecasting enrolment trends, based on an analysis of all the factors mentioned above; evaluation of investments required on the above basis; determination of teacher requirements and measures to ensure recruitment of the necessary teaching staff; determination of measures for efficient guidance of students and for the removal of obstacles to school attendance (transport, boarding facilities, school meals, scholarships); measures to ensure optimum utilization of investment funds.

I. Standards and costs

The evaluation of funds for the construction and equipment of school and university buildings is accomplished in two stages in the French plan. The first stage consists in working out material standards or norms for the new educational establishments. The results obtained are then used to calculate unit costs of construction and equipment.

This procedure is the subject of the first part of this study, while the second part will deal with the way in which the funds needed, by types and levels of education, are determined.

A. Norms

The standard norms adopted by the committee can be divided into two categories: those relating to the average number of pupils to be accepted in primary or secondary school classes, and, at the university level, the number of square metres per student; and those relating to the equipment and furniture to be provided at each level and for each type of education (general, industrial-technical, commercial-technical, etc.).

1. Methodology

The methods used to work out the norms of the first category are as follows:

(a) School regulations stipulate for every kind of educational institution the

average acceptable number of pupils admissible per class in general education on the basis of pedagogical criteria.

- (b) Model enrolment programmes are drawn up according to the population density in the recruiting areas. In fact, the population density together with the size of the area determines the school or university requirements. These standardized programmes should, in principle, meet all possible situations.
- (c) The specialized classrooms needed by the various kinds of schools are determined on the basis of the model enrolment programmes and the specific teaching requirements.
- (d) This procedure results in technical construction programmes which provide for the necessary rooms (the number of classrooms for general subjects and for specialized subjects, and additional premises) to accommodate the forecast enrolment with due consideration for hourly schedules and curricula, methods and disciplines. In this way the dimensions of the various kinds of rooms are standardized.

From these technical construction programmes it is possible to calculate an average number of square metres of ground and of building space per non-boarding, semi-boarding or boarding pupil (the average figures for semi-boarding pupils and full-board pupils are specified for each type of school).

At the university level a similar procedure is carried out, but it requires more complicated estimates because some of the subjects studied are common to several different courses and thus are followed by student audiences of varying sizes. Starting with the distribution of subjects by number of hours per week and by numbers of students, the required number of lecture halls and classrooms of the appropriate sizes are worked out, on the basis of an average total utilization of twenty-five hours per week per room (see appendix I).

These pedagogical and technical programmes are aimed primarily at (i) the conversion of pedagogical outlines into terms of educational establishments, and (ii) the simplification of administrative and technical procedures in construction with a view to reducing delays, and especially costs, by the use of mass production methods.

The following procedure was adopted in determining the norms relative to equipment and furniture:

- (a) Estimating the equipment and furniture required for each technical construction programme according to the purpose of the building (general education, industrial-technical, commercial-technical, etc.).
- (b) Calculating the average cost of the equipment and furniture (at a given time) for each type of building and expressing it as a percentage of the construction cost of the whole project (estimated for the same period of time and by procedures which will be analyzed later).
- (c) In this way, coefficients are obtained which serve to estimate in the later calculations the average cost of equipment and furniture on the basis of the cost of the building itself without having to repeat the operation in each case.

2. Data adopted

The norms of capacity and equipment are summarized respectively in tables 1 and 2.

3. Remarks

The norms are, with a few exceptions, those which had been adopted for the preceding plan. It can be seen that they were often very rigorously calculated. In the construction of university libraries, for example, only one place is allowed per ten students, and in the faculties of Arts and Law, too little space was allowed for rooms to be used for research.

TABLE 1. Capacity norms

Type of education	Maximum number of pupils per classroom	Number of square metres per pupil or student
Kindergarten	45	
Primary	35	
Secondary	35	
Ground		18 sq.m. per non-boarding pupil 15 sq.m. additional per pupil in industrial-technical schools 10 sq.m. additional per boarding pupil
Higher education:		
Arts and law		4 sq.m. construction per student
Science		12 " " " "
Medicine		20 " " " "
Pharmacy		16 " " " "
Engineering schools		25 " " " "
		(+ 15 sq.m. per dormitory student)
Libraries		1.5 sq.m. construction per student
Preparatory classes ¹	Second cycle standards increased by 25 per cent	
University Technology Institutes (IUT)	Same standards as for preparatory classes (for IUT in Arts and Law) Same standards as present technical secondary schools (for IUT in Science)	
Student facilities		
Social service buildings:		
Dormitories		18 sq.m. per student
Restaurants		4 sq.m. per student
Boarding facilities	Secondary school standards increased by 20 per cent	

1. These are post-secondary classes preparing for competitive entrance examination to the *grandes écoles* (higher technological institutes).

6. France

If these norms were not revised between the fourth and fifth plans, the normal development of either pedagogical requirements or those of scientific research could not take place. This was due to financial limitations prevailing at a time when rapid school and university expansion was creating huge demands for capital outlay, which could not be satisfied within the limits of the available funds.

At all events, the standards applied for the new investments under the fifth plan constitute great progress by comparison with the average older school and university buildings.

TABLE 2. Equipment norms

Type of education	Equipment standards
Kindergarten and primary	Construction and canteen equipment: 1 300 F per pupil fed
Secondary: complete	<i>As above</i> Construction and dorm. equipment: 7 500 per boarding pupil
First cycle	Equipment and furniture: 12 per cent of the building construction costs (including canteen and dormitory)
Second cycle, long	As first cycle plus 4,000 F additional per technical-vocational pupil: with the following increases over the non-boarding pupil cost in the technical high schools: 2,100 F per pupil in industrial-technical; 800 F per pupil in commercial-technical.
Second cycle, short	As second cycle, long expect for the following increases over the non-boarding pupil cost: 1,700 F per pupil in industrial; 800 F per pupil in commercial.
Higher education	Equipment and furniture as percentages of the building construction costs.
Arts and Law	15 per cent
Science and Medicine	25 per cent
Engineering	25 per cent
Libraries	35 per cent
Preparatory classes and IUT Arts or Law	17 per cent
Preparatory classes and IUT Science	17 per cent for general equipment + 4,000 F per student
Equipment for student facilities:	
Dormitories	1,612 F per student
Restaurants	440 F per student

B. Costs

The first part of this section will outline the committee's definitions of costs and their various components, and the way in which the estimates were formulated to allow for various significant factors. The second part will be devoted to a detailed study of the methods used for each type of education. Two examples of costs computation will be developed.

1. Cost definitions

The elements of cost adopted were the following: (a) cost of the ground; (b) cost of constructing buildings (including dormitories, kitchens and canteens, and libraries); (c) cost of equipment and furniture (including dormitories, kitchens and canteens, and libraries); and (d) cost of roads, walks, etc. where necessary.

All expenditure necessary for the complete installation of school and university buildings was, therefore, taken into account.

The fifth plan estimates were made on the basis of the price levels prevailing at the time. The method of estimating the various elements of cost will be dealt with in turn.

(a) Land

The following estimates were made for the cost of land:

- 30 francs per square metre for primary schools
- 40 " " " " " " secondary schools
- 50 " " " " " " higher educational establishments.

These differences in the estimated price of land allow for the fact that the proportion of buildings to be located in urban areas and in the more central parts of towns and cities is normally larger for secondary schools than for primary schools, and still larger for institutions of higher education. These were, of course, average costs, and no distinction was made between regions, as was done in the case of construction costs.

(b) Construction

The method of reasoning here is rather complex and needs to be explained in detail. First of all, one must bear in mind the regulations concerning the distribution of the financial burden of school building and equipment between the state and the local authorities.

At the primary level, the 'communes' are responsible for school-building, but they receive from the state a fixed subsidy amounting theoretically to 77 per cent of the total expense incurred by the 'commune' (ground, construction and equipment). At secondary level, the state grants a subsidy to a 'commune' for the construction of a school covering 50 per cent of the cost of the ground; 85 per cent of the construction cost on average, (the actual percentage varying according to the wealth of the 'commune' concerned, its rate of population growth, and the percentage of boarding pupils to be provided for in the school); and the entire cost of the initial equipment. At higher education levels, the burden of expense falls mainly upon the state.

These regulations make it necessary for the Ministry of education to calculate average construction and equipment costs, since the subsidies are not established according to the expenditure actually incurred but on the basis of *a priori* and theoretical estimates, with a view to simplifying and standardizing the procedure.

6. France

Since the difference between the estimated cost and the real cost may be large, the actual shares of the state and the 'commune' concerned may be quite different from the provisions of the law. This question will be examined in part II.

The rates thus established by the Ministry of education served as a point of departure for the calculations of the committee, but were later adjusted to allow for the following factors: (i) variations in the average construction cost between the time the rates were calculated and the time the analysis was made; (ii) geographic differences in building prices; (iii) distribution of school buildings at each level of education by size and type; and (iv) estimated savings due to the more intensive utilization of mass production methods than in the past.

(c) Official rates

Official rates were laid down by decrees of the Ministry of education (27 November 1962 and 31 December 1963) and by the directives of the Ministry of finance (3 March, 8 June and 3 December 1964).

The methodology for calculating these rates on the basis of pedagogical programmes and technical construction programmes consisted of using average construction costs per square metre (determined for a base period and adjusted to cover the increase in the index of building prices). The cost per building is thus obtained, and can then be reduced, by using the norms, to a cost per pupil or per square metre. (Table 3.)

It should be pointed out that in the case of kindergartens and primary schools, regulations stipulate the *subsidy* accorded by the state (on the basis of a theoretical share equivalent to 77 per cent of the total actual cost), while in the case of secondary and higher education it is the *theoretical cost* which is determined.

(d) Bringing costs up to date

Since the rates were established for the base period, the costs had to be brought up to date for the time at which the analysis was made (1965). The adjustment was made by using the coefficient of adaptation for new work (CATN), considered as the best index of price trends in that field. As the latest figure available was for October 1964, the extrapolation from 1964 to 1965 was made by means of the coefficient of progress known as the 'gross formation of fixed assets of public administrations' drawn up by the economic and financial research service (SEEF) of the Ministry of finance.

(e) Variation of costs according to the distribution of schools by zone, size and type

It was decided to divide France into four zones in order to allow for geographic differences in construction prices and to adjust the theoretical costs shown above. Indices were established to express the average price in each zone in terms of the zone of reference (the Paris area). The price indices adopted were the same as

TABLE 3. Official rates of state subsidy and theoretical costs

	Type of establishment	French francs
Subsidies ¹	<i>Kindergartens</i>	per classroom
	Less than 4 classrooms	103 000
	4 or more classrooms	95 000
	<i>Primary schools</i>	per classroom
	Less than 17 classrooms	81 000
	17 or more classrooms	77 000
Theoretical costs ²	<i>First cycle secondary</i> ³	per pupil
	Up to 300 pupils	3 990
	400 to 500 pupils	3 620
	600 or more	3 410
	<i>Second cycle (classic and modern)</i> ³	per pupil
	Up to 500 pupils	4 400
	600 to 700 pupils	3 800
	800 to 900 pupils	3 500
	1,000 or more	3 300
	<i>Additions</i>	
	Industrial-technical, short	1 700
	Industrial-technical, long	2 100
	Commercial-technical	800
	<i>If food is provided for pupils</i> ³	per pupil
	1 service only	1 680
	2 or more services	1 150
	<i>If dormitory facilities are provided</i> ³	
	per place	7 500
	<i>Higher education</i>	per sq.m.
	Arts and law	840
	Science and medicine	1 000
	Libraries	920
	<i>University Technology Institutes (IUT)</i>	As
	<i>and preparatory classes (per place)</i>	secondary schools.
	<i>Student facilities</i>	per place
	Dormitory	12 950
	Dining halls, cafeterias	3 900
	<i>Boarding schools</i> ³	
	Half-board	1 282
	Boarding per pupil	9 000

1. For the Paris area.

2. It should be borne in mind that there are a limited number of standard sizes for new secondary level buildings.

3. Costs to be adjusted by a coefficient of 1.61 in order to obtain the amounts for the Paris price zone, in conformity with the stipulation given in the decree.

those officially laid down to determine the relative costs of construction of the new, moderate rental housing (HLM) for each zone.

For pre-school, primary and secondary education, the distribution of buildings to be constructed in each zone was then determined by size and type, (in the case of secondary education, by type only). This operation served to apportion the construction effort to be carried out in each zone for each level of education.

In the case of higher education, owing to the fact that the buildings are almost all situated in large towns, a single cost figure, valid for the entire country, was adopted.

The appointment of buildings of each size and type among the four geographical zones was arrived at by different approaches according to the level of education; for example, the need for proximity between buildings and pupils' homes becomes less and less important as the level rises from primary to secondary and then to higher education.

A detailed study of the methods adopted will be given in the analysis of each educational level.

(f) Savings in costs due to mass-production methods

Owing to the extension of compulsory schooling to age 15 in 1967 and to age 16 in 1968, an especially large construction effort had to be undertaken for the first cycle of secondary schooling. The committee then estimated that it should be possible to reduce costs by 5 per cent by the systematic use of industrial production methods of construction.

(g) School canteens and boarding accommodation

So far, the evaluations related only to the construction of classrooms. In order to calculate the costs of canteens and boarding accommodation, an initial basis (involving construction and equipment) was provided by the official rates analysed above. These were then adjusted to 1965 prices; the canteens and boarding accommodation to be built were distributed by zones in the same way as the corresponding schools themselves, and the average percentages of pupils to be supplied with meals, and of full boarding pupils, were defined. The canteens were then distributed according to the number of services at meal times (as mentioned above, the unit cost of construction is obviously lower for canteens offering two services than for those offering only one).

(h) Equipment

The equipment cost was estimated either as a percentage of the construction cost or as a definite amount (see equipment norms, table 2). In this case there was no adjusting to 1965 prices, as the committee took fully into account the freezing of industrial prices; no zone adjustments were made either.

(i) Methods of calculation

The calculating procedure adopted by the committee (applied to all educational levels) consisted of including in the total cost per pupil place the cost of the canteens (and, in the case of secondary schools, the boarding accommodation) on the basis of estimates of the average percentage of pupils supplied with meals only, and

of full boarding pupils. This procedure attributed to every pupil an average share of the expense of construction and equipment of canteens and boarding accommodation. It is convenient because it enables the figures to be adjusted very easily, for example, if it is decided to accept a different percentage of semi-boarding pupils.

2. Detailed methods of calculation for each type of education

(a) Kindergarten

In this case, the first stage consisted of calculating the construction effort to be carried out in each zone. The distance between the school and the pupils' homes was obviously the governing factor in the siting of the buildings.

An evaluation was then made of the number of new kindergartens required as a result of the construction of large new residential centres. This showed the need for 430,000 additional pupil places.

A second approach was based on an extrapolation of the enrolment rates recorded in previous years (attendance not being compulsory at the kindergarten level), taking into account the growing popularity of this type of instruction and the fact that it meets a basic social need because of the increasing numbers of women who go out to work. This approach revealed needs for a total of 444,000 pupil places.

The combination of these two estimates suggested that new facilities should be created only in accordance with the new residential developments. This would meet the needs of the new residential areas, while the population decline in the older areas already served by schools should make it possible to raise the enrolment ratio by maintaining the existing capacity. To determine the distribution of the kindergartens by size, the following approach was used.

The official schedules stipulate two different rates of subsidy (and hence two sets of cost figures) according to whether kindergartens have less than four rooms or four rooms and over. It was therefore necessary to determine the distribution of each of these types among the new residential centres.

On the basis of some empirical data a figure of 0.3 child of kindergarten age per home was assumed for the new housing developments, where the percentage of young married couples is higher than the average. The size of the kindergartens to be constructed could, therefore, be estimated by the size of the new housing facilities.

Official statistics list the new housing facilities in each zone according to whether they contain from 100 to 500 flats or more than 500. In the first category, the average number of children of kindergarten age should not exceed 150, and a school of less than four rooms should therefore be theoretically sufficient (according to the standards). In the second category, the average number of children is higher and schools of at least four rooms would be required.

No other data are needed to distribute the kindergartens by zone and by size.

A practical point entering into the calculation remains to be clarified. The costs

defined by the decree of 31 December 1963 included the price of land, which was put at about 8 per cent of the total. When experience showed that the real cost was higher and that it had to be estimated at thirty francs per square metre, the theoretical cost per pupil was increased by the difference between the real price of the land (twelve square metres at thirty francs per sq. m. per pupil) and the assumed amount included in the fixed total cost (8 per cent of the cost).

(b) *Primary education*

The costing procedures for primary schools are similar to those used for kindergartens, the only difference being the determination of the distribution of the schools by zones.

The location of new primary schools is decided on the basis of new residential developments, but the data in this case are different; the average number of children of primary school age per home or flat is put at 0.55 (an average determined empirically); classrooms should accommodate thirty-five pupils; and the cost per room differs according to whether the schools contain less than seventeen rooms or seventeen rooms and over.

Considering the first two factors, it appeared that a seventeen-room school corresponded to a housing development of approximately 1,080 flats:

$$\frac{17 \times 35}{0.55} = 1,080$$

It was, therefore, assumed that schools of seventeen or more rooms should be built where there were housing developments of more than 1,000 flats, and that schools of less than seventeen rooms would be adequate for less than 1,000 flats:

Official statistics do not give the breakdown by zones of the newly constructed residential blocks according to whether they have more or less than 1,000 flats. It was therefore necessary to make an estimate on the basis of the table in appendix II. (Pre-school education). It was assumed that in areas P and A one half of the residential blocks listed as having more than 500 flats had in reality more than 1,000 flats, the corresponding proportion being one-fourth in zone B and none in zone C.

This is, undoubtedly, a very rough assumption, but an error at that stage is not likely to have much effect on the costs because the price differences of classrooms according to the number of rooms in the school are comparatively low (77,000 and 81,000 francs per room).

(c) *Secondary education*

First cycle: the two main factors which determine the location of secondary schools are the extension of compulsory schooling up to the age 16, and the structural reform of secondary education, involving the creation of the first cycle secondary school, to meet this new obligation. Indeed, at the time of the analysis the enrolment did not cover the entire 14 and 15-year age groups; moreover, a

number of children in these age-groups were still enrolled in other types of school (elementary vocational training or technical training), while still others had already passed into the second cycle. The equipment required in each zone had therefore to be established on the basis of these two elements.

Other factors entering into the costing process were as follows: (i) division of the total enrolment between two kinds of first cycle schools to be identical for all regions, on the basis of 15 per cent of total enrolment in schools for 400-500 pupils, and 85 per cent in schools for 600-700 pupils. These percentages were set as norms pending the determination, in 1972, of a definite distribution of the total enrolment between these two types of school. (ii) Meals are to be supplied for 80 per cent of the pupils; it was decided empirically that 25 per cent of these pupils would have their meals in canteens offering a single service, and 75 per cent in canteens offering two services. (iii) Boarders to amount to only 10 per cent of the total enrolment. It was believed that this percentage was adequate because of the increased number of schools and of the more extended use of the school bus service.

Second cycle, long: a large part of the potential enrolment at this level corresponds to age groups for which school attendance is no longer compulsory. The geographical location of the buildings was therefore determined so as to make the enrolment rate in each region coincide as nearly as possible with the national optimal rate, which has been fixed for this cycle at 35 per cent of the relevant age-group, not counting repeaters. The same method of approach was used as for the first cycle but with different enrolment rates.

Other costing factors in this case were assumed as follows: (i) The distribution between different subject groups within the cycle was established with a view to reaching, by 1972/73, the targets set by the committee, namely, 65 per cent of total enrolment in classic and modern, 17 per cent in industrial-technical, and 18 per cent in commercial-technical. On the basis of these targets and of the actual present distribution, the facilities to be built were determined for each optional course of study as shown in table 4. (ii) Division of enrolment by size of schools

TABLE 4. Division of new building capacities by subject branch (enrolment in thousands)

	Classic and modern	Industrial-technical	Commercial-technical	Remarks
1964/65	381	84	67	Actual distribution
1972/73	484 (65%)	127 (17%)	134 (18%)	Target distribution on the basis of forecast enrolment
Increase	103	43	67	Enrolment increase to be provided for
Percentage of increase	48.3	20.2	31.5	Percentage of increased building capacity per curricular option

SOURCE CESUS Report, appendix 8, p. 231.

was assumed to be identical for all regions, namely, 30 per cent of enrolment in schools for less than 500 pupils; 30 per cent in schools that could accommodate 800 or 900 pupils; and 40 per cent in schools for 1,000 pupils or more. (iii) Average percentages of pupils served with meals and of boarding pupils, by curricula, were estimated as shown in table 5.

TABLE 5. Ratio of pupils fed and of dormitory pupils by curricula

	Classic and modern curriculum (percentage)	Technical curriculum (percentage)
Pupils receiving meals	65	75
Dormitory pupils	30	50

Second cycle, short: in this case also, the enrolment in each region is to be brought as nearly as possible in line with the optimal national rate, which is 40 per cent of the corresponding age group.

Other factors in the cost calculation were (i) a distribution by curricula estimated at 40 per cent for the industrial, 35 per cent for the economic and commercial, and 25 per cent for the administrative branches; (ii) the distribution by size was assumed to be identical for all regions with 40 per cent of total enrolment in schools of less than 500 pupils, 40 per cent in schools of 600 or 700 pupils, and 20 per cent in schools of 800 pupils or more; and (iii) an average of 75 per cent of pupils served with meals and 30 per cent of boarding pupils.

(d) Higher education

The operations in this case being highly complicated, it is not proposed to examine in detail the way in which they were conducted for each type of faculty, IUT, etc. We shall instead limit ourselves to examining in a general way the method of approach which was adopted and to pointing out that the calculations were made under five different headings: preparatory classes, IUT, faculties and engineering schools, university libraries, and other larger buildings. A detailed example will be thoroughly studied later.

It should be noted that the construction norms were determined in square metres per student. The estimates were, therefore, those of costs per square metre, subsequently converted into costs per student by using the norms. Some exceptions were made in determining the funds necessary for the completion or improvement of certain important buildings (e.g. the faculty of sciences of the Sorbonne).

The construction cost proper was fairly easily determined, as the unit costs per square metre had been laid down in directives of the Ministry of finance and had only to be brought up to date in 1965 prices. As already stated, there was only a single evaluation to be made—by type of education—for the entire territory.

The estimate of the ground space per student and the corresponding cost, however, required more complicated calculations. It was necessary first, to deter-

mine the ratio to be adopted between *construction areas* and *related ground areas*. For this purpose the following data were necessary: the ratio between the total floor space of the building and the ground space actually covered (which corresponds roughly to the number of storeys of the buildings); and the ground-to-building coefficient (ratio between the ground area actually built upon and the total area of the land considered necessary).

For the teaching premises, libraries and amenity buildings an average solution was adopted with a floor space to ground ratio of 2.5, and a construction coefficient equivalent to 25 per cent of the land area. Under these conditions, it was necessary to have, per square metre of area built on:

$$\frac{100}{25 \times 2.5} = 1.60 \text{ sq. m. of ground space}$$

To that amount was added an average of fifteen square metres of ground per student for parking and general services. On this basis, it was possible to establish the data in table 6.

To the cost of the ground must be added the cost involved in the necessary access roads and utilities, which was fixed at twenty francs per square metre of undeveloped land (see directive of Ministry of finance dated 3 March 1964).

TABLE 6. Recapitulation of ground areas necessary per student and per type of higher education

Purpose of structure	Floor space required per student (sq. m.)	Ground space required per student (sq. m.)
Colleges or schools:		
Arts or law	4	6.40
Science	12	19.20
Medicine or pharmacy	20	32
Engineering	25	40
Libraries	1.5	2.4
IUT		
Arts or law	—	18
Scientific or technical	—	33
Dormitories	18	28.8
Kitchens and dining halls	4	6.4
Buildings of the same type as secondary boarding schools	—	10
Parking and general services	—	15

SOURCE CESUS Report, appendix 8, p. 234.

In the case of facilities and accommodation for students (dormitories and restaurants), two different systems were adopted: the system referred to as *oeuvres* (separate works or buildings) for students of faculties of a university, some IUT students, and those of some of the engineering schools; and the *internat* (boarding-school) system, for students of the preparatory classes, some engineering schools

and IUT. This system is similar to the secondary-level boarding schools but with better standards. The detailed computations covering these facilities will not be analyzed.

II. Use of costing in establishing the plan

The investment outlay required was determined by the committee on the basis of unit costs and of the number of pupil or student places to be provided. An examination of the methods used for this purpose is made below.

The initial recommendations of the committee submitted to the General Commissioner of the plan were the object of a governmental revision which reduced the funds requested. The committee was then asked to assign priorities to the various targets and to redistribute the total allocation of funds between the various types of education. It used the method of proportionate scaling-down of requirements in order to clarify the choices which had been made and their consequences at each level. Costing again played a vital role at this stage, by enabling a rapid evaluation to be made of the facilities which could actually be built in the light of the reduction of funds. All these procedures will be studied in the second part of this section, which will also contain a critical analysis of the methods used, especially as regards costing.

A. Estimate of student facilities required

The calculations were made on the basis of the forecast of student facilities required at the end of the Fifth plan—or more specifically, by October 1972, at which time all construction work provided for in the plan should have been completed and in use—taking into account also the facilities capable of being used at the end of the Fourth plan, estimated in a similar way.

It is, therefore, appropriate to examine the definitions and methods adopted in these two procedures.

1. *Evaluation of student facilities utilizable at the end of the Fourth plan*

This was a matter of listing the student facilities which were supposed to be available when all the equipment provided for under the Fourth plan had been put into operation. It is a normal procedure to take as a point of departure what is assumed to have been accomplished with funds already allotted and spent.

The time-lag between the end of the plan period and the completion of all the works was estimated at about two years. At the time when the committee was doing its work, all the funds allocated had been committed and it was therefore possible

to itemize the corresponding operations and draw up a relatively accurate report of the situation, as shown in table 7.

TABLE 7. Student facility capacities at the end of the fourth plan

Type of education	No. of students accommodated after completion of fourth plan	Remarks
Kindergarten	1 686 000	Considered equal to the enrolment expected in the school year 1967/68 For CEG (vocational and general), CES and first cycle of regular high school
Primary (elementary)	4 159 000	
First cycle secondary	1 712 000	
Second cycle, short	356 000	Mentally handicapped } as of " " } 1 Jan. Sense handicapped } 1966
Second cycle, long	615 000	
Special schools and classes	54 878	
	1 240	
	983	
Preparatory classes	29 000	To these will be added the student places resulting from the release of buildings by university colleges moving to new buildings
IUT	22 500	
Art colleges	89 000	Figures obtained by the following method of calculation:
Colleges of law	55 000	1. Space available after completion of fourth plan.
Colleges of the sciences	140 000	2. Division of this total space by the space per student (4 sq.m. in arts or law colleges, 12 sq.m. in the sciences, etc.)
Schools of medicine	28 250	3. Increased by 25% of the result of the division
Schools of pharmacy	7 700	
Schools of engineering	15 700	

SOURCE CESUS Report, p. 62.

These estimates, which required a considerable amount of statistical data, call for the following comment.

The figures for places available were calculated on the basis of norms. For places in higher education, for example, the total available floor space was divided by the norms. Clearly, the result thus obtained is theoretical and the number of students actually received is larger than indicated by this result, owing to a more intensive utilization of the facilities. This is true everywhere in higher education in France.

This method of calculating capacities has a very strong effect on the evaluation of the progress accomplished during the plan: the effort to be accomplished is calculated *as if the entire time-lag accumulated in relation to the norms would be made up*— in addition, of course, to the measures necessary to accommodate the additional number of students resulting from the fulfilment of the enrolment targets of the plan.

2. Estimate of facilities required at the end of the Fifth plan

(a) General remarks

From the viewpoint of methodology, the approach differed according to whether the type of education concerned fell within the age limits of compulsory schooling or not.

In the first case, it was necessary to have valid population projections—allowing also for population shifts into the area, although these were fortunately not large—and to evaluate correctly the number of maladjusted or handicapped children to be admitted to special schools.

In the second case, (non-compulsory ages), it was necessary in addition to forecast the enrolment rate, which could be done either by simple extrapolation of expressed past demand,¹ or by arbitrarily setting the rates to be attained at a given time for each type of education.

Both methods have in fact been used simultaneously. Demand was determined by extrapolation of past trends and, at the same time, the *distribution* of enrolment by subject groups at the end of the first and second cycles of secondary schooling was decided upon by the committee, as were also the percentages of each age-group to be admitted to the second cycle of secondary schooling and to higher education.

This latter procedure was necessary in order to achieve a balance between the trainings provided in the educational sector and the trainings required in the productive sector.

The forecasts made by the committee, except in the case of higher education, concerned the total school enrolment, public and private, and all types of training. However, as the funds provided through the committee concerned only public schools and institutions under the Ministry of education, a distribution was made of the total enrolment forecast on the assumption of a general decline in private education.

(b) Detailed methods of projection

We shall examine here only a few of the more significant aspects of the methods which were adopted.

1. The concept of expressed demand has been distinguished from that of spontaneous demand owing to the fact that in some fields of education insufficient accommodation has had the effect of reducing the spontaneous demand.

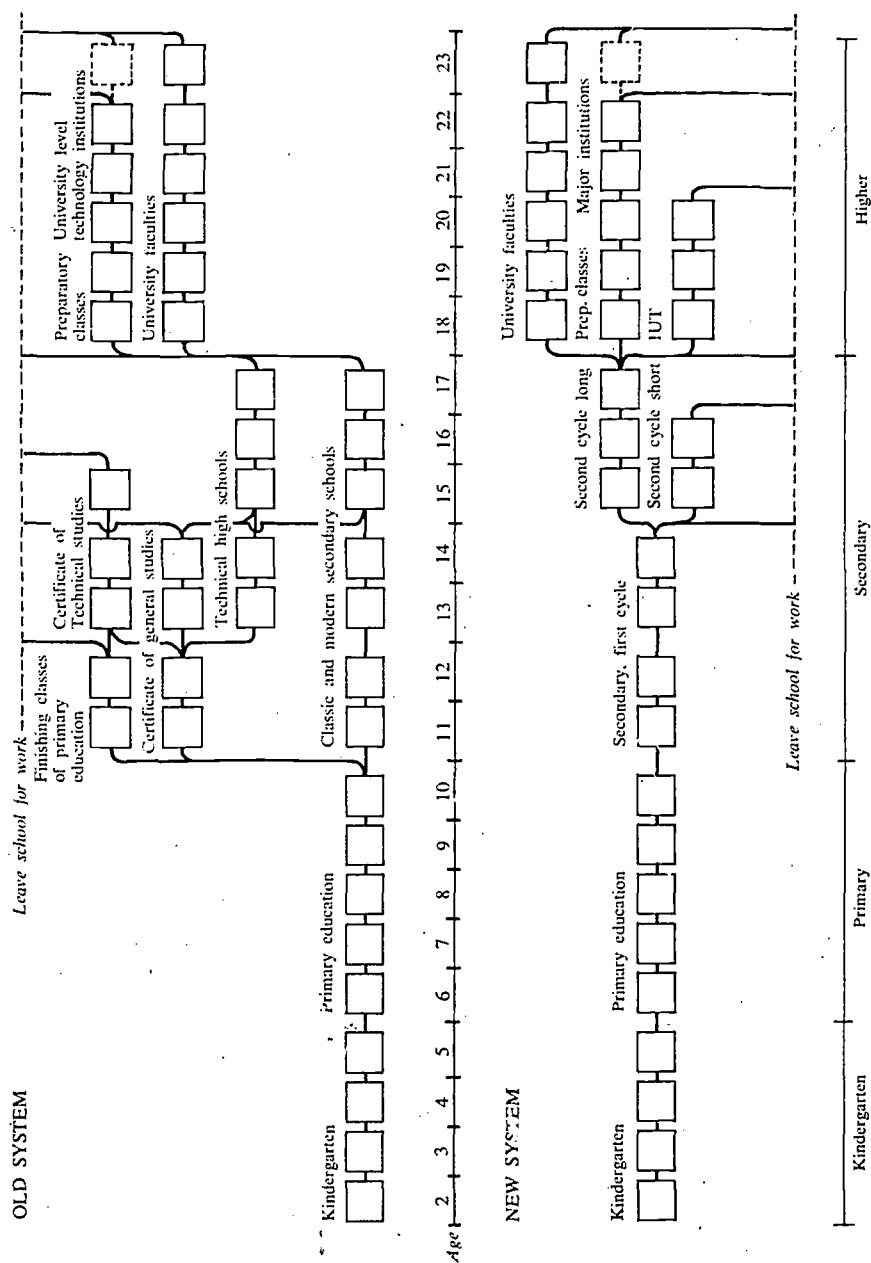


FIGURE 1. The old and the new pedagogical structures.

(i) *Secondary education, first cycle*

The new pedagogical structure is outlined in figure 1 (the old system is also shown for comparison).

First-cycle secondary instruction is now given in the CES (Certificate of scientific studies) and CEG (Certificate of general studies) types of schools extending from the 6th to the 3rd form (7th to 10th grade) inclusive. However, it does not include all the children in schools at that level, because there are still some in the elementary finishing classes of the old system and in the first two years of the CET (Certificate of technical studies) curriculum, corresponding to the 4th and 3rd forms. In connexion with the reform of the first cycle, all these pupils are to be regrouped in the CES and CEG types of schools.

Owing to the residual influence of the former structures and to current difficulties—pupils already enrolled in finishing classes or CET courses of the old formula; the impossibility of creating immediately all the CES and CEG schools required; problems relating to the utilization of funds; etc.—the committee reached the conclusion that the installation of the new structures should be spread over the period until the end of the implementation of the plan (beginning of the school year 1972/73). A timetable was provided for a gradual reduction of the numbers of pupils in elementary finishing classes and in CET courses of the old formula.

(ii) *Secondary education, second cycle*

Three options are offered to pupils completing the first cycle of secondary schooling: admittance to the long second cycle (full classical, modern or technical secondary); admittance to the short second cycle (CET new formula); and leaving school and entering the labour force.

In order to determine the way in which the children completing the first cycle would be divided between these three options, the committee put the accent on three factors, the first and third of which correspond to observed trends, while the second corresponds to a norm and to anticipated needs.

First factor: social demand. This obviously constitutes a basic factor. The extension of compulsory schooling will increase the number of children entering the second cycle, and so will the introduction of the new first-cycle structures and the diversification of curricula in the second cycle.

Second factor: requirements of the economy. At this stage, the work was conducted in co-ordination with the Manpower committee. Requirements were assessed in terms of *qualification* levels and the following relationship was established between these qualifications and the graduating level: levels 1 and 2, higher education of a standard type; level 3, higher technical education; level 4, completion of full secondary schooling with diploma (*baccalauréat*); level 5, completion of short-cycle secondary; level 6, completion of compulsory schooling.

This method of approach was, however, used with discretion in view of the problems created by technological development and the insufficiency of statistical data.

Third factor: practical possibilities. Due account was taken of the fact that not all children reach the same levels of advanced education, and of the material

possibilities (funds, recruitment of teachers) with the result that the committee set as a target, for the period 1972-75, the following distribution of pupils of the age-group completing the first cycle of secondary schooling: promoted to the full secondary (long second), 35 per cent; entering the short second cycle, 40 per cent; leaving school for employment, 25 per cent.

Detailed forecasts were then made on the basis of that distribution which, in principle, would not be attained until the end of the period. For the *second cycle, long*, general enrolment projections were made, allowing for 14 per cent of repeaters. Distribution by types of schools, years and subjects was worked out on the basis of a provisional breakdown provided by the Ministry of education for the year 1972.

In the case of the *second cycle, short*, the distribution by subjects and years was also based on data worked out by the ministry for 1972: 40 per cent of the total in industrial education (compared with 75 per cent at the beginning of the plan); 35 per cent of the total in commercial education (compared with 25 per cent at the beginning of the plan); 25 per cent of the total in administrative education (compared with none at the beginning of the plan).

(iii) *Higher education*

Two methods were used for assessing the number of students during the period of the plan.

The first method consists in a simple extrapolation of past trends and is based on the ratios between enrolments at the different levels of education. In this way, the ratio between the number of students and the number of secondary school graduates during the four preceding years was used. This figure varied between 1:0.90 and 1:1.08 during the ten years preceding the study. The committee assigned a target of 1:1.12 to be attained by 1972.

Similarly, a ratio was established between the number of secondary school graduates and the number entering secondary school seven years earlier. This figure was broken down into ratios—the total of graduates to the number in school three years before, and the latter figure to the number finishing primary school four years before that. The targets adopted for 1972 were respectively 0.50 and 0.67. Thus, the number of students entering university can be estimated from the number of admissions to secondary school during the preceding years.

The second method takes as its point of departure the enrolment forecasts of the long second cycle and the assessment of the requirements of the economy resulting from the work of the Manpower committee. It was assumed that 33 per cent of the enrolment of a given age-group should complete the full secondary schooling (second cycle, long), and that 60 per cent of these should enter higher education. This calculation gives a rate of admissions to higher education of about 20 per cent for a given age-group.

Both methods provided similar estimates.

The forecast of the trend of enrolment by discipline and by type of institution was then made on the basis of two major targets: an increase in scientific studies at the expense of literary studies, and the development of the new IUT. A general

summary of these forecasts is given in the following tables 8 and 9 and in figure 2.

TABLE 8. Forecast enrolment percentages for 1972/73 (public and private)

Age	Special instruction	Kinder-garten	Primary	First cycle secondary	Second cycle short	Second cycle long	Total ¹
20						2.1	2.1
19					0.5	8.7	9.2
18					7.9	23.1	31.0
17				5.2	23.3	32.0	60.5
16	0.2			19.7	27.8	30.3	78.0
15	2.7			69.7	9.5	18.1	100.0
14	3.5			92.3		4.2	100.0
13	4.2		5.9	89.9			100.0
12	4.3		18.5	77.2			100.0
11	4.2		51.6	44.2			100.0
10	4.3		89.1	6.6			100.0
9	4.2		95.8				100.0
8	3.4		96.6				100.0
7	2.1		97.9				100.0
6	1.5	1.8	96.7				100.0
5		82.7	14.9				97.6
4		92.0					92.0
3		74.0					74.0
2		37.6					37.6

1. After age 17 enrolment rates shown in this table do not accurately reflect the situation for the age-groups considered, because higher education is not included.

TABLE 9. Total enrolment forecasts (public and private) (in thousands)

Year	Special instruction	Kinder-garten	Primary	First cycle Secondary	Second cycle short	Second cycle long	Higher
1972-73	282.4	2 408.6	4 624.6	3 306.8	561.7	964.2	792.9

3. Investment necessary for the creation of additional educational facilities

The amount of investment funds to be provided at each level of education is obtained by multiplying the unit costs by the number of places forecast. The results are summarized in table 10.

B. Arbitration

The investment recommendations formulated by the committee (see table 10) were submitted to the government, which rendered its decisions by setting a ceiling of 25.5 thousand millions francs for the total amount of funds to be financed by the national and local authorities.

Educational cost analysis in action: case studies for planners

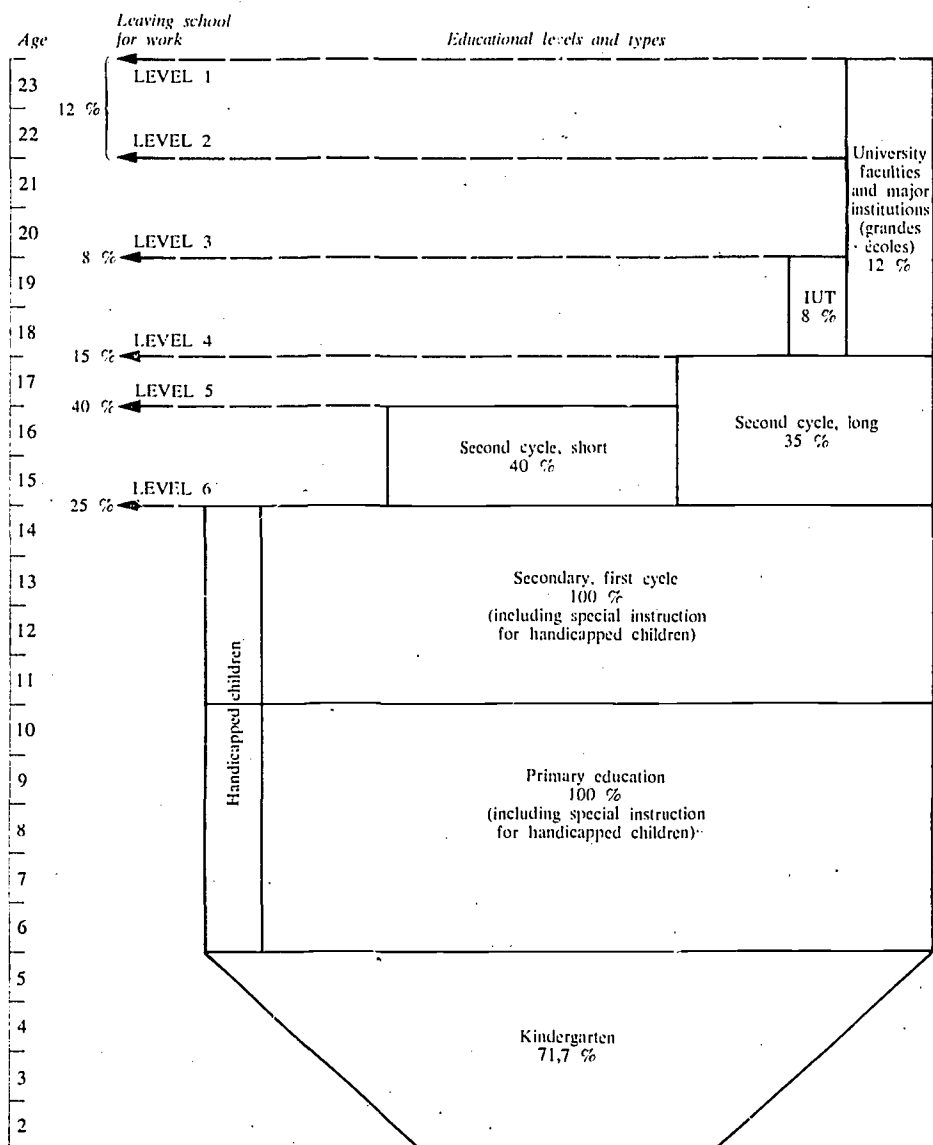


FIGURE 2. Flow chart showing average percentage of enrolment in schools and universities as forecast for 1972-75.

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TABLE 10. Recapitulation of investment requirements forecast by the committee

Type of construction	Essential factors of computation	Amount forecast by commission (millions of francs)
Kindergarten	430 000 places at 3 381 F	1 454
Primary	790 000 places at 3 495 F	2 761
First cycle secondary	923 000 places at 8 926 F	8 239
Second cycle, short	107 000 places at 17 741 F	1 898
Second cycle, long	128 000 places at 17 122 F	2 192
Handicapped children	1/3 of needs reported by Intergroup	1 250
Higher education	8 000 places in preparatory at 7 876 F 68 000 places IUT arts and law at 7 772 F 50 000 places IUT scientific at 17 979 F 529 000 sq.m. in Arts and law colleges at 1 398 F 970 000 sq.m. in Science colleges at 1 515 F 361 000 sq.m. in Engineering schools at 1 496 F 431 000 sq.m. Schools of medicine at 1 478 F 169 000 sq.m. in Schools of pharmacy at 1 472 F 510 million for miscellaneous improve- ments 198 million for major institutions	6 305
Boarding schools and university student facilities	35 000 boarding school places at 17 157 F 59 000 half-board places at 2 597 F 39 000 dormitory rooms at 17 399 F 39 000 dormitory rooms at 7 097 F 76 000 dining hall places at 5 033 F	2 094
Additional equipment		581
French overseas departments	Work of the Overseas commission	600
Socio-educational and sports equipment	Legislation provides 2,500 million plus 8/92 of the investment funds for educational institutions	
GRAND TOTAL		31 714

The committee was then called upon to adopt a procedure which was the reverse of the initial one, i.e., to break down the total into the funds to be utilized for each investment item. Priorities were determined on the basis of certain criteria which will be analyzed in section 1 below, while the methods of distribution will be examined in section 2, and the effects of these measures in section 3. Section 4 will deal with the distribution of funds between the state and the local authorities.

1. Determination of priorities

The committee considered as top priority a primary school enrolment of 100 per cent and the installation of the new first cycle of secondary education. This was motivated first of all by the principle of compulsory schooling, but also by the belief that these were pre-requisites for a sound development of full secondary (second cycle, long) and higher education programmes. The principle of democratizing education obviously played a strong part in this selection of priorities, since it was considered essential to expand the opportunities for secondary education in order to make full use of the existing potential and thus up-grade educational efficiency.

The next priority was the development of technical education at the secondary and higher level, in view of the lag in that field. For similar reasons, it was decided to make a particular effort in special education for handicapped children.

These concepts were approved by the government, but it nevertheless reduced substantially the funds earmarked for kindergarten and primary education, relying, in all probability, upon the following two factors: the possibility of limiting admissions to kindergarten if the demand should become too heavy, and the possibility of increasing the number of pupils per class.

2. Distribution of funds

It should be pointed out, first of all, that a reduction in the funds allocated to a given type of education does not mean that pupils or students will be turned away. They will be admitted, but at the cost of a more intensive use of classrooms and equipment than planned, with the result that norms may not be fully respected. A basic principle of the reasoning of the committee was involved, namely, that there should be *no reduction in the educational targets*.

This introduces the concept of the degree of satisfaction of needs. This degree of satisfaction, for each level of education, can be expressed as the ratio between the number of pupils or students which should be admitted theoretically if the standards were respected, and the number actually admitted. It is computed from global data and not from the increases themselves, and it indicates the extent to which the requirements, as evaluated with reference to the norms, are covered by the facilities actually constructed. This degree can also be defined as the ratio between the theoretical and actual norms, thus measuring the percentage of satisfaction of the norms.

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The distribution of funds among the various levels and types of education was therefore made on the basis of degrees of satisfaction of requirements in relation to the norms, and the highest degrees of satisfaction were applied, in principle, to the types of education considered as having priority. (It may be remembered that the allocation of funds initially planned by the committee corresponded to 100 per cent satisfaction of the norms in all fields of education by virtue of the method of calculation adopted).

This distribution can be seen in table 11.

TABLE 11. Final distribution of investment funds for school, university and sports equipment (in millions of French francs)

Item	Amount planned by the committee	Amount allocated after government arbitration	Percentage of reduction
Kindergarten	1 454	1 160	20.2
Primary	2 761	2 350	14.9
First cycle secondary	8 239	7 500	9.0
Second cycle, short	1 898	1 710	10.0
Second cycle, long	2 192	1 250	42.9
Handicapped children	1 250	900	28.0
Higher education	6 305	4 820	23.5
Boarding and student facilities	2 094	1 310	37.4
Additional equipment	581	450	22.5
Overseas departments	600	550	8.3
Socio-educational and sports equipment	4 340	3 500	19.3

TABLE 12. Degrees of satisfaction of requirements at the end of the fifth plan

Educational level	Admittance capacity at the end of the fifth plan (thousands)	Enrolment forecast for 1972 (thousands)	Theoretical degree of satisfaction (percentage)
Kindergarten	2 116	2 116	100.0
Primary	4 949	4 949	100.0
First cycle secondary	2 552	2 635	97.0
Second cycle, short	452	463	97.7
Second cycle, long	688	743	92.6
Higher education	675 ¹	793	85.2

1. Allowing for the average number of students absent from the class or lecture hall.

It will be noted that, apart from the kindergarten and primary levels, the highest rates of satisfaction are in the first cycle and the second cycle short (technical), which were given priority. On the other hand, the lowest degrees of satisfaction are in the types of schools which have the highest flexibility of utilization (because of *weekly* rather than daily schedules) or in which non-satisfaction of the norms is least serious (as in the case of higher education, owing to the prevailing situation).

3. Effects of fund reductions

The effects of these measures can be analysed in several different ways. (It is assumed here that the costs and requirements were correctly established and correspond to reality. The deficits which will be shown are, therefore, *a priori* amounts, since they are estimated from evaluations concerning the future. It would be interesting to make *a posteriori* evaluations after the actual results for the period covered by the plan are known.

It is possible to make a *total* appraisal for each type of level of education by evaluating the number of additional places which can be made available by means of the funds allocated, and by calculating the deficits which will result in relation to the total enrolment at that level on the basis of the forecasts.

It is also possible to make a *marginal* appraisal by relating the deficit not to the total enrolment, but to its *increase* during the period covered by the plan. The marginal percentage of the deficit is then expressed by the same number as the rate of reduction of the corresponding funds (see table 11). The choice between total and marginal deficit will depend on the specific situation and will be examined below.

One could also compare the rates of satisfaction of norms at the end of the fourth and of the fifth plan respectively, in order to show the progress accomplished during the five-year period. The data are given in table 13, and commented on below.

TABLE 13. Total and marginal deficits¹

	Average percentage of deficit	Marginal percentage of deficit
Kindergarten	4.2	20.2
Primary	3.0	14.9
First cycle secondary	3.0	9.0
Second cycle, short	2.3	10.0
Second cycle, long	7.4	42.8
Higher education	14.8	23.1

1. The sum of the average percentage of deficits plus the average percentage of satisfaction is equal by definition to 100.

(a) Kindergarten education

Here, it is the concept of marginal deficit which is significant, because the location of kindergartens was determined on the basis of new needs (construction of new housing complexes). The size of the deficit is such that serious problems could be raised, and it would probably be necessary either to increase the number of pupils per class, or to establish locally a minimum age for admission.

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(b) Primary education

Similar comment could be made in this case but, since attendance is compulsory, the problem will be the number of pupils per class (unless some of the premises formerly used by vocational schools¹ and made available by the creation of scientific high schools are used).

(c) Secondary education, first cycle

As the new buildings for this type of school are planned throughout the country, it is the average deficit which becomes significant. Since this deficit is only about 3 per cent, the situation should be satisfactory. However, there may be some difficulties owing to the size of the CES and CEG (scientific and general schools), because it is not at all certain that a 600-pupil scientific school will be filled and utilized to full capacity from the moment of its completion, and the real deficit could be temporarily greater than the rate indicated above.

Comparing the construction timetable with the annual contingents of additional pupils, it may well be that the deficit at a given moment is larger than was estimated for the end of the plan. This is especially true of the first-cycle secondary schools owing to the reform at that level and the difficulties involved in the rapid installation of the new structures (see Secondary education first cycle, p. 185).

TABLE 14. Rates of satisfaction of standards at the end of the fourth plan

Educational level	Capacity at the end of fourth plan (thousands)	Expected enrolment in 1967 (thousands)	Theoretical rate of satisfaction of standards (percentage)
Kindergarten	1 686	1 686	100.0
Primary	4 159	4 159	100.0
First cycle	1 712	1 884	90.9
Second cycle, short	356	447	79.6
Second cycle, long	615	637	96.5
Higher education	335,650	525	64.0

SOURCE CESUS Report, p. 63.

Comparison with the rates of satisfaction estimated for the end of the fifth plan shows the progress accomplished during the period covered by the plan—progress which can be analyzed by means of its two components: accommodation of the additional contingent applying for admission, and improvement of accommodation for the *entire enrolment*.

4. Distribution of costs between the state and the local authorities

It has already been indicated how the financial aid provided by the state to the

1. The committee recommended that some of the vocational facilities be used for the instruction of handicapped children—which was possible for about 4,000 classes out of 13,000.

'communes', for the construction of school buildings is determined. An important clarification should be made, however, in that connexion.

In the case of buildings for secondary education, the local authorities can either exercise the supervision and responsibility for the work or entrust these tasks to the state. In the first case, the government provides a subsidy calculated as a lump sum by the procedures already mentioned, and if that amount is exceeded, the local authority must meet the difference. In the second case, it is the local authority which pays its share to the government, also in the form of a fixed amount, and any excess must then be covered by the government. This latter formula is by far the most frequently used (90 per cent of the cases), but it should be pointed out that, owing to large reductions in real costs (in the field of secondary education) due to an intensive use of mass production procedures, the share actually borne by the government is considerably less than was anticipated. The distribution of expenditure provided for by law is, therefore, only approximate.

One effect of the arbitration carried out by the government has been to determine the definite amount of investment to be provided (25.5 thousand million francs) and also the maximum amount which can be covered by the national budget (20.9 thousand million francs). The government share of educational expenditure as forecast is shown in table 15 on the basis of the *actual percentages now practised* to determine the amount of the government subsidy.

TABLE 15. Authorized amounts for necessary educational investment programmes, under present provisions of the plan, for 'all communities together' (in millions of French francs)

Major item expenditure	Amount authorized for all communities together	Theoretical average percentage of government aid	Amount of government share
Kindergarten	1 160	72.0	835
Primary education	2 350	72.0	1 692
First cycle secondary	7 500	80.0	6 000
Second cycle, long	1 250	86.5	1 081
Second cycle, short	1 710	86.5	1 479
Handicapped children	900	85.0	765
Higher education	4 820	98.0	4 724
Student facilities and dormitories	1 310	98.0	1 284
Additional equipment	450	79.0	355
Overseas departments	550	90.0	495
Socio-educational and sports equipment	3 500	64.0	2 240
TOTAL	25 500		20 950

SOURCE CESUS Report, p. 101.

Since the share incumbent on the government turned out to be higher than the maximum amount authorized by the government, the committee took note of the fact that the local authorities would have to stand a heavier burden than expected.

In fact, according to the CESUS report of December 1968 on the implementation of the plan covering the three years 1966-68, the communes financed more

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than 41,000 pupil places in pre-school instruction and more than 89,000 pupil places in primary education without any subsidy from the government, but they were usually helped by a public school fund controlled by their respective 'departments' which were themselves financed by the government.

5. Critical analysis of methods

In the final analysis, it can be stated that the costs have been computed in an adequate manner and have included all the more significant factors. We shall, therefore, offer only a few comments.

With a few exceptions, the committee did not foresee any special effort for the renovation of existing educational premises. In this, it was influenced by the magnitude of the effort to be accomplished and also by the considerable renovation of the school complex resulting from the new constructions built in the course of the three previous plans, so that anything not having priority was excluded. In reality, however, a certain amount was actually earmarked for repairs and improvements owing to the condition of some of the older schools. Considering that the planned investments were intended for accommodating increased enrolment and for the *improvement of norms*, the repair of old buildings can be said to aim at the latter.

The estimates are still more or less aggregate, which is inevitable owing to the diversity of the operations to be undertaken. Nevertheless, it would be interesting to make retrospective calculations on the basis of a sample of new buildings in order to see if there are large differences between forecasts and actual achievements, and to analyze the causes of any such differences. This would make it possible to get closer to reality and to improve the forecasting methods.

Costs were computed on the basis of 1965 prices, which must be adjusted when each annual budget is established.

It should be added that the new educational buildings have been located on the basis of the enrolment forecast for a few years ahead, and could not, therefore, be expected to be filled immediately; but this point has no bearing upon the cost estimate.

Conclusion

In conclusion, stress should be laid on the importance of costing in assessing educational investments. The analysis of costs has been carried out rather thoroughly, even if it can be considered as too aggregate. It would perhaps have been better to be more realistic, particularly with reference to renovation of old buildings and, where necessary, to correct the estimates obtained by extrapolation of

official figures by means of a retrospective examination of real costs. By means of a few adjustments, it would be possible to improve the estimates still further.

Moreover, costs are closely linked with norms, and cost accuracy depends, therefore, upon the value of the norms. We have seen that the norms adopted rested upon solid foundations, even if they were evaluated in some cases rather strictly. However, these standards are themselves linked with pedagogical requirements, which will certainly change and develop in the future, and it will be necessary to re-appraise them periodically. In any case, it is necessary to evaluate them with some degree of flexibility in view of the length of time for which the educational equipment is being planned.

The arbitration of budget appropriations is generally carried out on a priority basis. We shall merely point out that the lack of certainty and precision in the costing processes could easily result in over-construction for some types of education and under-construction for others, and the resulting facilities might not be in conformity with the order of priority established at the outset.

The question can also be raised as to whether it would not be preferable to establish the final distribution of funds between the various types of education on the basis of more accurate economic criteria than those which have been used in French planning. By taking into consideration a certain number of factors—needs of the economy for qualified manpower at different levels and the comparative urgency of these needs, the social utility of the pre-school instruction, etc.—it might be possible to find a method of distribution based on the assessment of marginal utilities in the global economic structure. This is, of course, a theoretical approach which would require preliminary appraisals and complex research, but it would undoubtedly be a profitable one to follow. Naturally, final decisions concerning the distribution of funds should take into consideration not only the results of this economic approach, but also a whole series of other factors (social ones, for example) which are of basic importance, even if they are not expressed in terms of figures.

The concept of rate or degree of satisfaction of the norms should also be given full consideration, because it sheds light upon priorities in a very simple way and gives a clear idea of the progress accomplished at the end of the plan. The relative nature of this concept must, however, be stressed because it obviously depends upon a series of norms defined in advance and which have *different degrees of flexibility*.

The French experience in the use of costing for the forecasting of investment requirements in the educational sector must be considered as of great interest. But the method requires a mass of data that would make its application difficult in countries which do not have an adequate statistical infrastructure.

Appendix I

Model pedagogical programme for the construction of a university college of law and economic sciences (4,000 students)

I. Inventory of requirements

(a) Students: enrolment forecast for 1972

Years of study		Number of students
'Licence' (B.Sc. degree)	1st year, Law	1 520
	Economic sciences	820
	2nd year, Law	720
	Economic sciences	400
	3rd year, Law	380
	Economic sciences	220
	4th year, Law	270
	Economic sciences	130
'Licence'	(Decree No. 61-1154 of 18 October 1961) 1st and 2nd years	140
Doctorate	Doctor of Science in history of law and sociology	320
	, , , in private law	
	, , , in criminology	
	, , , in political science	
	, , , in public law	
	, , , in economic sciences	
	Doctor's dissertations	
Doctorate	in a speciality (3rd cycle)	50
Doctorate	of university (not State Doctorate)	20
Institutes	Legal studies: preparation for entrance examination for 'CNEJ' ¹ certificate	60
	for public administration certificate	70
	Economic studies: Business management course	210
	Certificate in penal sciences	10
	Certificate in political and social economy	40
	Auditors (not candidates for a certificate)	40
Total		<u>5,420²</u>

1. National centre for legal studies.

2. The number of students actually enrolled is greater than the theoretical number because of:
(a) average absenteeism equal to 20 per cent of the total enrolment; (b) the fact that the degree of satisfaction of the norms does not equal 100 per cent.

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(b) Teaching staff

Professors, Agrégés (assistant professors holding master's degrees), Chargés de Cours (lecturers), Maître-Assistant (assistant professors), 'Assistants' (instructors), Monitors.

TABLE 1. Number of teaching staff

Sections (Major subjects)	Professors		Agrégés		Lecturers		Asst. profs.		Instructors		Monitors	
	1965/66	1972	1965/66	1972	1965/66	1972	1965/66	1972	1965/66	1972	1965/66	1972
History of law,												
Roman law	3	6	2	3	1	—	0	3	2	h	0	10
Private law	8	12	2 ¹	4	2	—	2	6	10	15	18	20
Public law	7	11	1	4	3	—	1 ³	6	12	17	10	20
Political economy	5	11	2 ²	5	3	—	1	6	8	13	6	20
TOTAL	23	40	7	16	9	—	4	21	32	51	34	70

1. including 1 assigned to Yaoundé.

2. including 1 assigned to Rabat.

3. assigned to Beirut.

II. Weekly number of hours of lectures and of practical work

TABLE 2

Courses	Hours of lectures		Hours of practical work sessions
	in halls	in classrooms	
<i>'Licence'</i>			
(first degree)			
1st year Law	30 h. ¹		228 h. ²
Economic sciences	30 h. ¹		123 h. ²
2nd year Law	33 h. ¹		108 h. ²
Economic sciences	16 h.		60 h. ²
3rd year Law	13 h. 30	10 h. 30	57 h. ²
Economic sciences	16 h. 30		33 h. ²
4th year Private law	10 h. 30		42 h. ²
Public law	12 h.		
Options		9 h.	
4th year Economic sciences	7 h. 30	18 h.	21 h. ²
<i>'Licence'</i> (Decree No. 61-1154 of 18 October 1961)			
1st and 2nd years		19 h. 30	26 h. 15 ²
<i>Doctorate</i>			
History of law		15 h.	
Private law		15 h.	
Criminology		15 h.	
Public law		15 h.	
Political science		15 h.	
Economic sciences		15 h.	
<i>Institutes (IUT)</i>			
Legal studies			
Judiciary		8 h.	
Public administration		6 h.	
Economic studies			
Management	10 h. 30	4 h.	60 h. ²
<i>Certificate of penal sciences</i>			
		6 h. 30	
<i>Certificate of political and social economy</i>			
		4 h. 30	
TOTAL	179 h. 30	176 h.	758 h. 15

1. with doubling of courses.

2. in groups of about 20.

III. Rooms required for lectures and practical work

(a) Number of hours in lecture halls: 179 hours 30 minutes

Number of hours in classrooms: 176 hours

Number of hours of practical work: 758 hours 15 minutes.

The total weekly utilization of these premises having been determined as twenty-five hours, the requirements are then established as follows:

$$\text{Lecture halls} : \frac{179\frac{1}{2}}{25} = 7$$

$$\text{Classrooms} : \frac{176}{25} = 7$$

$$\text{Practical study rooms: } \frac{758\frac{1}{4}}{25} = 31$$

(b) *Determination of student study rooms*

First degree: 36 rooms of 40 places of 50 sq.m. each: 1,800 sq.m.

Doctorate : 10 rooms of 20 places of 20 sq.m. each: 200 sq.m.

TOTAL 2,000 sq.m.

TABLE 3. Distribution of lecture halls

Years or study	No. of hours per week	No. of halls	No. of places	Area of each hall	Total area
1st year Law or Econ. sciences	60 h. (30 h. × 2)	2	700	560 sq.m.	1 120 sq.m.
2nd year Law	33 h.	3	400	320 sq.m.	960 sq.m.
Econ. sciences	(16 h. 30 × 2)				
3rd year Law	13 h. 30	2	250	200 sq.m.	400 sq.m.
Econ. (IEE)	10 h. 30				
4th year Law—public and private	10 h. 30 12 h. 00				
3rd year Econ. sciences	16 h. 30				
4th year Econ. sciences	7 h. 30				
					2 480 sq.m.
<i>Service rooms</i>					
7 professors' waiting rooms		15 sq.m. × 7	= 105 sq.m.		
7 projection booths		15 sq.m. × 7	= 105 sq.m.		
7 reserve rooms		20 sq.m. × 7	= 140 sq.m.		
5 machinery rooms		20 sq.m. × 5	= 100 sq.m.		
				450 sq.m.	450 sq.m.
GRAND TOTAL					2 930 sq.m.

6. France

Distribution of classrooms

Type of room	No. of rooms	No. of seats per room	Unit areas	Total areas
Large rooms	2	150	150 sq.m.	300 sq.m.
Medium size rooms	3	100	100 sq.m.	300 sq.m.
Small rooms	2	70	70 sq.m.	140 sq.m.
TOTAL	7			740 sq.m.

Distribution of rooms for practical work

Type of room: 30-seat; n° of rooms: 31; n° of seats per room: 30; unit areas: 40 sq.m.; total areas: 1 240 sq.m.

Distribution of special rooms

3 rooms for seminars, meetings, etc. of 30 seats each
 $3 \times 30 \text{ sq.m.} = 90 \text{ sq.m.}$
 21 rooms of 20 seats each for smaller study groups, 1st year students
 $21 \times 20 \text{ sq.m.} = 420 \text{ sq.m.}$
510 sq.m.,

Distribution of offices for professors, assistant professors, etc.

40 offices for full professors 20 sq.m. each 800 sq.m.
 37 offices for 'agrégés', associate professors, 15 sq.m. each 555 sq.m.
 25 offices for instructors, 15 sq.m. each 375 sq.m.
TOTAL 1 730 sq.m.

Administration and general services

Dean's office 30 sq.m.
 Waiting room 15 sq.m.
 Office of secretary to Dean 15 sq.m.
 2 offices for advisers (20 sq.m. \times 2) 40 sq.m.
 Secretariat of faculty 20 sq.m.
 Enrolment service
 Registrar's office 15 sq.m.
 Enrolment personnel office 140 sq.m.
 Accounting service
 Chief Accountant's office 15 sq.m.
 Accounting staff office 60 sq.m.
 Telephone switchboard 10 sq.m.
 Copying service and exercise files 100 sq.m.
 College files 140 sq.m.
 Storeroom for materials 30 sq.m.

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Repair and maintenance shop	30 sq.m.
2 janitor's rooms (10 sq.m. × 2)	20 sq.m.
'Salle des actes' (official proceedings, documents, diplomas)	50 sq.m.
Council and assembly	120 sq.m.
Professors' room (Faculty room)	80 sq.m.
Two committee rooms (20 sq.m. each)	40 sq.m.
General Secretary's apartment	100 sq.m.
'Conciergerie'	
1 office	20 sq.m.
1 living quarters	50 sq.m.
1 porter's lodge	20 sq.m.
Living quarters for technician in charge of mechanical installations	90 sq.m.
TOTAL	1 250 sq.m.

University Institutes of Technology (IUT)

Economic courses (managerial, business executives)

Director's office	20 sq.m.
Waiting room	10 sq.m.
Secretariat	15 sq.m.
Office for instructors and technical assistants	45 sq.m.
2 offices for section heads	30 sq.m.
Documentation and reference room	50 sq.m.
Archives	30 sq.m.
TOTAL	200 sq.m.

Law courses

Director's office	20 sq.m.
Waiting room	10 sq.m.
Office of the secretary and secretariat	30 sq.m.
Office for instructors and assistants	45 sq.m.
Documentation and reference room	60 sq.m.
Archives	35 sq.m.
TOTAL	200 sq.m.

Comparative law

Director's office	20 sq.m.
Waiting room	10 sq.m.
Secretary and secretariat	15 sq.m.
Office for instructors and assistants	45 sq.m.
1 classroom	60 sq.m.
1 documentation and reference room	50 sq.m.
TOTAL	200 sq.m.

IV. Recapitulation

Students' work and study rooms	2 000 sq.m.
Lecture halls	2 930 sq.m.

6. France

Classrooms	740 sq.m.
Rooms for practical work	1 240 sq.m.
Special rooms	510 sq.m.
Rooms and offices for professors and assistants	1 730 sq.m.
Administration and general services	1 250 sq.m.
IUT	600 sq.m.
	<u>11 000 sq.m.</u>
Increase of 40 per cent for clearances, halls and corridors, etc.	4 400 sq.m.
Service rooms, boiler rooms, garages	600 sq.m.
	<u>16 000 sq.m.</u>

Appendix II

Practical example of costing

Basic data

(a) Amount of the subsidy (at 77 per cent) for the Paris area per classroom (1963 francs):

Classroom constructed in a building of less than 4 rooms: 103,000 F

» » » » » 4 rooms or more: 95,000 F

(b) CATN October 1963: 1.74 Index FBCF 1964: 1.000

» » 1964: 1.61 » » 1965: 1.018

(c) Housing distribution according to zone and size of structure.

Size of structure	Zone				Total
	P	A	B	C	
More than 500 flats	16	6	24	2	48
100 to 500 flats	18	5	27	2	52
TOTAL	34	11	51	4	100

Costing

(a) Index to bring 1963 prices up to 1965 prices:

$$IP\ 65/63 = \frac{CATN\ Oct.\ 64}{CATN\ Oct.\ 63} \times \frac{Ind.\ FBCF\ 65}{Ind.\ FBCF\ 64} = 1.1002$$

(b) The average cost of construction of one classroom, taking into account the distribution of schools by zones, is arrived at in the following manner:

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$$*C_{63} = 103,000 \times \frac{100}{77} \times [(1 \times 0.16) + (0.95 \times 0.06) + (0.92 \times 0.24) + (0.89 \times 0.02)]$$

*per classroom	Subsidy for schools of 4 rooms or more	Re-evaluation for commune share	p_1 = Weighting coefficient according to distribution of school buildings cf 4 rooms or more by price zones
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$$+ 95,000 \times \frac{100}{77} \times [(1 \times 0.18) + (0.95 \times 0.05) + (0.92 \times 0.27) + (0.89 \times 0.02)]$$

*per classroom	Subsidy for schools of less than 4 rooms	Re-evaluation for commune share	p_2 = Weighting coefficient according to distribution of school buildings of less than 4 rooms by price zones
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$$C_{63} = 122,251 \text{ F} \quad p_1 = 0.4556 \quad p_2 = 0.4937$$

Re-evaluation in 1965 francs:

$$C_{65} = C_{63} \times IP_{65/63} = 122,251 \times 1.1002 = 134,500.55 \text{ F.}$$

Average classroom construction cost per pupil place

$$\frac{C_{65}}{45} = 2988.9$$

(a) Average cost of construction and equipment of school lunch rooms or cafeterias, allowing for the same distribution by zones as for the schools:

$$C^1_{63} = \underbrace{1\,300}_{\substack{\text{Average} \\ \text{cost of} \\ \text{construction} \\ \text{and equipment} \\ \text{per pupil}}} \times \underbrace{0.20}_{\substack{\text{Average} \\ \text{percentage} \\ \text{of pupils} \\ \text{fed}}} \times \underbrace{(p_1 + p_2)}_{\substack{\text{Weighting} \\ \text{coefficient} \\ \text{(cf. above)}}$$

Re-evaluation in 1965 francs:

$$C^1_{65} = C^1_{63} \times IP_{65/63} = 271.5$$

(b) Additional costs per pupil for the ground:

Price of land assumed to be included in the fixed price per pupil place:

$$0.08 \times 2988.9 = 239.1 \text{ F}$$

Estimated real price:

$$12 \text{ sq.m.} \times 30 \text{ F} = 360 \text{ F}$$

$$\text{Addition: } 360 - 239.1 = 120.9 \text{ F}$$

6. France

Entire cost per pupil place (pre-school)

Cost of construction and material:	2 988.9
Cost of construction and material:	2 988.9
Construction and equipment of food serving facilities:	271.5
Addition for cost of land:	120.9
TOTAL	<u>3 381.3</u>

Appendix III

A sample calculation

College of science

Basic data

Construction cost per square metre in 1964 francs: 1,000 F

Coefficient of conversion to 1965 francs : 1.0607

Equipment cost: 25 per cent of the building cost

Calculation

Construction cost per student place in 1965 francs:

$$12 \times 1,000 \times 1.0607 = 12,728.4$$

(12 = number of square metres per student.)

Equipment cost per student place:

$$12,000 \times 0.25 = 3,000 \text{ F.}$$

Cost of land per student place:

$$19.2 + 15 = 34.2 \text{ sq.m.} \quad 34.2 \times 50 \text{ F} = 1,710 \text{ F.}$$

Cost of access roads and public utility systems:

$$20 \times 34.3 \times 1.0607 = 725.5.$$

TOTAL COST 18,164 F.

Thailand

Educational cost analysis

prepared by H. W. Reiff

The author, a Unesco expert in educational planning, was formerly at the Unesco Regional Office for Education in Asia, Bangkok, where he collected the basic data used in this case-study. The report was written with the help of Mr. J. Hallak, Deputy Chief Investigator of the IIEP Project. Mr. P.H. Coombs, Chief Investigator of the IIEP Project, served as principal adviser to the study. Comments and suggestions by several experts have also been incorporated, including those of Miss M. Woodhall of the IIEP staff, who helped to finalize the present report. The author and the IIEP gratefully acknowledge the assistance given by officials of the Thai Ministry of education and planning for their co-operation in the preparation of the study.

Preface by IIEP

This case study deals with three separate but related matters:

1. the calculation of unit costs for various levels of education in Thailand, based on different sources of financial information;
2. an attempt to analyse these unit costs with a view to measuring educational efficiency;
3. an attempt to use the results of the cost analysis to suggest ways of increasing educational efficiency.

The first part of the case study describes a search for basic information about unit costs, and the behaviour of individual components of educational costs in Thailand. It demonstrates that, in a country where statistical information is inadequate, where there are considerable discrepancies between urban and rural areas, and where money expenditures give only a rough idea of the real costs of education (e.g., because of the use of 'free' time and land), the educational planner is often obliged to resort to first-hand collection of data to secure the raw material for meaningful cost analysis. It shows also how planners can develop fresh insights by combining cost data from different sources.

In this instance data from the annual budget and from a sample school survey were combined to give estimates of the cost per pupil in Thailand. Unfortunately the author does not indicate how representative the sample of schools was and, in view of the discrepancies he reveals between cost estimates based on budget data and those based on sample data, this would have been desirable. However, this section does demonstrate clearly the difficulty of obtaining accurate estimates of unit costs in a developing country, and the necessity to combine different sources of information. It also evokes some useful questions, for example:

- (a) What are the main factors that determine the level of educational costs?
- (b) What is the relationship between the costs of education and its results?
Are there significant differences between schools, or between levels of education in this relationship?
- (c) Is it possible to increase efficiency by reallocating expenditures?

The later sections of this study attempt to answer these questions by looking at some of the factors that determine differences in cost, by making one fairly simple measurement of educational efficiency and relating it to the cost estimates, and by suggesting some ways of reallocating expenditures in order to increase educational efficiency. The possible uses of such information for educational decision-making are also considered.

The cost analysis leaves many questions unanswered, for example, the causes of variation of capital costs, yet the study is valuable if only for raising such questions. For often one of the most useful results of an analysis of cost behaviour is to uncover important questions, which then require further research to provide answers. The conclusions of this study provide some indications of further research necessary in Thailand.

Introduction

The purpose of this case study is to use the experience of Thailand (a) to illustrate the need for estimating costs with the help of both macro-data (national budget and school census) and micro-data (sample surveys) in order to obtain accurate figures; (b) to give an example of an analysis of the behaviour of costs by examining trends over the period 1954-64 in the Thai educational system; and (c) to describe a way of using cost data to measure educational efficiency and to provide a tool for appraising basic features of educational systems.

The estimate and analysis of educational costs demand some knowledge of the educational system. A brief description of the system in Thailand is given in appendix I, while some of the administrative and financial aspects are dealt with in appendix II.

Unless defined differently, 'cost' is measured in this case study by the amount of expenditure on either human resources (teachers) or physical resources (facilities, equipment). Thus some opportunity costs (for example, income forgone) are not included.

Data on finance, money outlays and unit costs have been obtained from a report prepared at the Unesco Regional Office for Education in Bangkok¹ which was the basic source of reference used in this case study.

The report is divided into four parts: Parts I and II provide estimates of recurrent and capital unit costs which are obtained by supplementing unit cost data obtained from macro-sources (budgets and total enrolment figures) by figures provided by a sample survey; Part III analyses recurrent cost per graduate for various levels of education over the period 1954-64; and in Part IV some features of the Thai educational system are examined in the light of cost data related to individual schools. Lastly, there is a brief evaluation of the cost analysis, both from a methodological point of view and in terms of its usefulness to the educational policy-maker.

1. Unesco, *Financing and cost of education in Thailand*, Bangkok, Regional Office for Education in Asia, 1966, Mimeo.

I. Analysing recurrent unit costs

This section examines recurrent expenditure per pupil or student as shown by budget estimates, and then compares it with cost data given by a sample survey.

A. Budget estimates¹

On the basis of data on recurrent expenditure, given in appendix I, and enrolment statistics, it is possible to analyse trends in recurrent unit costs over the period 1954-64. It would be interesting to know to what extent the rise in expenditure is accounted for by the growing enrolment and to what extent by rising costs, and whether increases in cost reflect an extension or improvement of the educational facilities provided. The examination of trends in average expenditure per pupil or student for all levels combined can be of little help in this respect, since its variation may be largely affected by changes in the school pyramid (the 'educational mix'): the larger the proportion of enrolment in expensive types of education the higher the unit expenditure, other things being equal. Thus a more detailed analysis of expenditure by type of education is required.

Changes in the administrative structure of education also affect comparisons between different periods, and it would be meaningless to compare, for example, the expenditure per pupil by the Department of secondary education at the period when it included elementary as well as secondary education with expenditure for secondary education alone. This explains the need for the information given in appendix II on administration and finance, and emphasizes the point that analysing costs has little significance without considering the administrative and financial structure of the educational systems involved.

TABLE 1. Recurrent budgetary expenditure per pupil (baht)

Type/level of education	1954	1959	1964
Kindergarten	—	—	554
Primary (grades 1 to 7)	198 ¹	236 ¹	261
Secondary (grades 8 to 12) ²	752 ¹	897 ¹	1 005
Average (primary and secondary) ³	(207) ³	(256)	(293)
Vocational/technical	1 270 ³	1 121	2 367
Teacher training	—	2 670	3 138
Universities ⁴	7 084	5 599	9 423

1. Estimate based on the average unit expenditure for primary and secondary education, assuming that the ratio between the two in 1954 and 1959 was the same as in 1964 (1 : 3.85).

2. Not including subsidies to private schools.

3. Estimate (since capital expenditure was not available for 1954, a percentage equivalent to that of 1959 has been deducted from the total expenditure).

4. Including other sources of financing. For Thammasat University, figures are based on full-time equivalent enrolment.

1. \$1 US = 20.83 baht.

Having adjusted the data on expenditure to make them comparable throughout the period 1954-64, we have estimated the trend of recurrent unit expenditure by level. Table 1 gives the results of these calculations.

The table, which has been computed from budget figures¹ (excluding central administration) and enrolment figures for each type and level of education, can be analyzed from two points of view:

(i) *Relation between the different types of education*

If recurrent expenditure per pupil at the primary level in 1964 is taken as 100, the other types and levels of education relate as follows: kindergarten, 210; primary level, 100; secondary level (general), 300; vocational technical education, 900; teacher training, 1,200; universities, 3,600.

(ii) *Trends*

For the period 1954-64, table 2 shows the percentage increases in recurrent expenditure per pupil in current and constant prices (using the deflator which is used to estimate GNP in constant prices).

TABLE 2. Percentage increase in recurrent expenditure per pupil, 1954-64

Type of education	Current prices (percentage)	Constant prices (percentage)
Primary	32	13
Secondary	34	15
Average primary and secondary	(42)	(21) ¹
Vocational/technical	86	60
Universities	33	14
All types	57	37

1. The fact that the percentage increase for 'Average primary and secondary' is higher than that for either taken separately is caused by a change in the enrolment distribution over the period 1954-64.

It may be noticed from table 2 that in each type of education there has been a real, but rather moderate increase in recurrent expenditure per pupil, except in vocational education, where the increase has been substantial. This might be explained to a large extent by a continuously decreasing pupil/teacher ratio in vocational schools. It is worth elaborating somewhat at this point on this type of education, since it is given high priority in the educational plan. Table 3 gives information on various types and levels of vocational and technical education. It is evident from this table that the expenditure per pupil for lower vocational education is extremely high, mainly because of a low pupil/teacher ratio. On the other hand, in upper vocational education it is surprisingly low, lower even than in the secondary academic stream (1,005 baht). This might be due partly to the fact that 41.5 per cent of the secondary school teachers receive a monthly salary

1. The effect of including other sources of income with the increase in unit expenditure figures would be less than 5 per cent.

7. Thailand: 1

TABLE 3. Recurrent expenditure per pupil in various types of vocational/technical education, 1964

Type of education	Salaries	Total recurrent expenditure	Enrolment	Recurrent expenditure per student (baht)
	(million baht)			
Lower vocational education (grades 8-10)	39.1	45.7	10 356	4 412
Upper vocational education (grades 11-13)	15.6	22.7	27 858	815
Higher technical education (grades 14-15)	11.4	17.6	5 212	3 375
Agricultural education (grades 8-13)	6.7	11.7	3 419	3 422
Short vocational courses	2.0	3.0	5 206	576

of more than 1,000 baht, whereas only 37.3 per cent of vocational school teachers receive such salaries. This, in turn, is explained by the fact that in secondary general education 66 per cent of the teachers were qualified (at least fourteen years of schooling), whereas in vocational education the relevant proportion was only 49 per cent.

University education also deserves special attention because its recurrent unit cost is by far the highest (9,423 baht in 1964), as shown in table 4.

TABLE 4. Recurrent expenditure per student at the university level, by purpose (baht)

	1954 Percentage		1959 Percentage		1964 Percentage	
General administration and common services	—	—	—	—	1 023	11
Equipment, materials and maintenance	3 325	47	1 626	29	2 671	28
Salaries of lecturers	2 383	34	3 685	66	5 445	58
Transfer:						
Scholarships	1 187	17	42	1	118	1
Other social expenditures	189	2	246	4	166	2
TOTAL	7 084	100	5 599	100	9 423	100

This table shows that over the period 1954-64 unit salary costs have been rising, while the per-student allocation for equipment, materials and maintenance shows a decreasing trend. The combined effect of these two trends on the quality of university education in Thailand will be discussed later. The strongly decreasing trend in unit costs for scholarships may be partly due to the fact that more and more national scholarships are being transformed into foreign ones (under the Prime Minister's budget).

So far, recurrent unit costs have been analyzed on the basis of macro-sources of statistics, namely budget and overall enrolment figures. But macro-sources have numerous weaknesses, because they deal only with large aggregates, and this may limit the scope of the analysis and the accuracy of cost figures obtained in this manner. We have tried, therefore, to make a comparative analysis on the basis of both macro- and micro-cost figures through a sample survey for each level of education.

B. Sample figures

A sample survey was carried out, with the assistance of officials in the Ministry of education, in over a hundred schools. The sample consisted of fifty public primary schools, fifteen private primary or secondary schools, twenty public secondary schools, ten vocational schools and ten teacher-training institutions. The universities were studied separately and all of them were included. The results of this sample survey are presented below.

1. Primary schools

In the budget of the Department of elementary education, no distinction could be made between the operational expenditure of the various types of primary schools and between the annual salaries of central and regional administrators, inspectors and supervisors. The sample survey made it possible to make certain distinctions. For example, there were in 1964 at least *seven* types of primary school operating in the kingdom, as shown in table 5.

TABLE 5. Breakdown of types of primary school

Type	Authority	Grades	Staff	Number in sample
<i>Public schools</i>				
1.	Department of Elementary Education	1-4	Classroom (c.r.) teachers only	20
2.	Department of Elementary Education	1-7	c.r. + specialist teachers	15
3.	Department of Elementary Education	1-7	c.r. teachers only	5
4.	Department of Elementary Education	5-7	c.r. + specialist teachers	5
<i>Municipal schools</i>				
5.	Governor	1-4	c.r. teachers only	5
<i>Private schools (all including secondary grades)</i>				
6.	Subsidized by Ministry (including mission schools)	1-7	—	5
7.	Profit-making (no subsidy)	5-7	—	5

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The average recurrent costs per pupil of the sample schools are shown in table 6, which also gives a comparison with the estimates based on macro-data.

TABLE 6. Recurrent cost per pupil in primary schools, 1964 (baht): a comparison between budget estimates and sample figures

	Sample survey ¹ Unit recurrent cost			Budget ² Unit recurrent cost		
	Teacher salaries	Others ³	Total	Teacher salaries	Total	Others ³
Type 1	309	60	369	240	21	261
Type 2	353	100	453			
Type 3	294	100	394			
Type 4	463	100	563			
Type 5	264	50	314	—	—	—
Type 6	212	80	292	—	—	—
Type 7	239	80	319	—	—	—

1. Figures of sample survey schools include unit expenditure on materials as financed by donations, and profits on the selling of school meals, stationery etc., but exclude expenditure by pupils on these items.
2. Figures exclude unit expenditure on central administration.
3. Including budget allocation for administration (salary headmaster, salary janitors) and instructional materials.

The table shows that the average recurrent cost per pupil of the sample public primary schools (types 1 and 4) ranges between 369 and 563 baht, and has a weighted average of 385 baht. This is 48 per cent higher than the 1964 budget estimate of 261 baht. The 124 baht difference is caused by a difference in teacher salaries per pupil of seventy-eight baht and in other unit recurrent costs of forty-six baht.

The difference in teacher salaries per pupil is partly due to the fact that the average pupil/teacher ratio in the sample survey (29:1) is considerably lower than for the country as a whole (38:1).

The average national budget allocation for other recurrent expenditure (twenty-one baht per pupil) is much lower than the average expenditure for this item in sample schools (sixty-seven baht). This was to be expected since the latter figure includes non-budgetary sources of income.

Although the sample is not fully representative of the national situation, it is possible to use the relative differences it gives in unit salary costs between the various types of schools in order to adjust the average figure in the budget, and thus obtain a reasonable estimate of total unit costs in elementary schools alone. These estimates are as follows: type 1, 269 baht; type 2, 339 baht; type 3, 299 baht; type 4, 413 baht; type 5, 314 baht; type 6, 292 baht; type 7, 319 baht.

2. Secondary general schools

Five types of secondary general school have been included in the sample, as shown in table 7.

TABLE 7. Breakdown of types of secondary (general) schools

Type	Grades	Number in sample
8. Urban secondary schools	8-12	10
9. Rural secondary schools	8-12	10
10. Comprehensive schools	8-13	5
11. Private subsidized secondary schools	8-12	5
12. Private non-subsidized secondary schools	8-12	5

Table 8 gives an indication of the average recurrent expenditure per pupil in each of the five types of school as compared with the national average for secondary general education calculated from budget figures.

TABLE 8. Recurrent cost per pupil in secondary general schools, 1964; a comparison between budget estimates and sample figures (baht)

Type of school	Sample survey ¹ Unit recurrent cost			Budget ² Unit recurrent cost		
	Teacher salaries	Others ³	Total	Teacher salaries	Others ³	Total
Type 8	822	207	1 029	875	130	1 005
Type 9	1 043	377	1 420			
Type 10	860	560	1 420			
Type 11	810	200	1 010			
Type 12	731	200	931	—	—	—

1. Including unit expenditure on materials as financed by other than budgetary sources of income (donations, fees, etc.).

2. Excluding unit expenditure on central administration and subsidies to private schools.

3. Including expenditure on administration, maintenance and instructional materials.

The average expenditure per pupil on salaries, as revealed by the survey, compares reasonably with the national average obtained from budget data, especially if we consider that most public secondary schools are in urban areas and that in 1964 there were only a few comprehensive secondary schools in operation.

The unit salary costs are higher in rural than in urban schools due to the former having a lower pupil/teacher ratio (11:1, as against 19:1) and to the fact that urban schools usually have a greater enrolment, so that the fixed number of specialist teachers needed are probably more intensively utilized, with corresponding economies of scale. As far as other unit costs are concerned, the considerable difference between budget and sample estimates is mainly due to the fact that the latter include expenditure on these items financed by non-budgetary sources, such as donations, fees, etc., (as in the case of primary schools).

The relatively high figures for type 9 and 10 schools are caused by under-utilization and by the fact that comprehensive schools need a wider range of materials per pupil than the conventional type of school.

The average figure for primary and secondary levels, as shown in the budget has been adjusted in the light of the data obtained in the sample survey to give the following estimates (in baht) of per-pupil expenditure in each type of secondary school: type 8, 999; type 9, 1,382; type 10, 1,389; type 11, 1,010; type 12, 931.

3. Vocational schools

Table 9 gives the two types of vocational school, which were the only ones covered by the sample.

TABLE 9. Two types of vocational school covered by the sample

Type	Grades	Number in sample
13. Rural vocational schools	8-13	5
14. Urban vocational school	8-13	5

While the sample is not representative of the national situation, because only these two types of school have been included—whereas the budget item for vocational schools also includes technical schools and technical teacher-training institutions—a comparison between micro- and macro-data is of interest, as shown in table 10.

TABLE 10. Recurrent cost per pupil in vocational schools, 1964 (baht); a comparison between budget estimates and sample figures

Type of school	Sample survey ¹ Unit recurrent cost			Budget ² Unit recurrent cost		
	Teacher salaries	Others ³	Total	Teacher salaries	Others ³	Total
Type 13	3 256	1 744	5 000	1 498	869	2 367
Type 14	1 131	1 119	2 250			

1. Including unit expenditure on materials financed by non-budgetary sources of income (donation, fees, etc.)

2. Excluding unit expenditure on central administration.

3. Including expenditure on administration, maintenance and instructional materials.

The extremely high unit salary figure for type 13 schools is due to the fact that in the sample schools six classroom teachers and ten specialist teachers, on average, are serving a school of fifty-five pupils. This is not a common feature of rural vocational schools, as argued by the unit salary figure obtained from budgetary sources. It would seem that type 14 schools are more likely to represent the national picture.

There is no doubt, however, that a number of vocational schools (in which grades 8-10 are being gradually abolished) are not being fully utilized, especially in the rural areas.

As is seen from the sample, the expenditure per pupil on items other than salaries (average about 1,500 baht) is much higher than the average budget allocation of 869 baht; this is because the sample schools financed some of these items from donations, fees, and (in some cases) income from the sale of pupil-made products. In adjusting the national average, it is estimated that both the unit salary cost and the unit non-salary recurrent cost amount to around 1,500 baht, so that an average total unit cost of 3,000 baht for all types of vocational schools seems reasonable.

4. Teacher-training institutes

A sample of ten teacher-training colleges has been taken, of which seven were in urban and three in rural areas. A difficulty in analysing the budget of a teacher-training college is that the operational costs of one or more associated 'practice' schools are included.¹

Another difficulty is that it is impossible to separate the operation of grades 11-12 (leading to a certificate in education), grades 13-14 (leading to a diploma in education) and grades 15-16 (leading to a B.Ed.), since teachers lecture at all levels and non-salary items are being devoted to all grades.

In table 11 the national average unit costs are compared with the average of a sample of five teacher-training colleges covering grades 11-14.

TABLE 11. Recurrent cost per student in teacher-training institutes, 1964 (baht): a comparison between budget estimates and sample figures

Type of school	Sample survey Unit recurrent cost			Budget Unit recurrent cost		
	Teacher salaries	Others	Total	Teacher salaries	Others	Total
Teacher-training college (grades 11-16)	1 364	272	1 636	2 105	1 033	3 138

It is likely that neither the figures from the sample survey nor the macro-figures give a good indication of the financial operation of the average for the following reasons:

- (a) The sample colleges include the budgets of both primary and secondary 'practice' schools, whereas only the expenditure of the primary schools are included in the national figures.
- (b) The average pupil/teacher ratio of the sample colleges is 15 : 1 against a national average of 13 : 1.

1. If the 'practice' school is a primary school, the operational costs are borne by the Department of teacher-training; in the case of a secondary school, the Department of secondary education finances the budget.

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(c) The average enrolment per sample college is 2,124, against a national average of 698.

(d) The relatively heavy weight of the salaries of central administrators, supervisors and inspectors is represented in the national figures, but not in the sample survey figures.

For these reasons, we have made an independent estimate of the unit recurrent costs of teacher-training colleges, based on a different type of data. On the basis of a medium salary of teachers in teacher-training institutions of 16,343 baht and of an average student/teacher ratio of 13 : 1, the unit salary cost is estimated at 1,250 baht.

The unit cost of non-salary recurrent expenditure is estimated as 1,000 baht (budget estimate), so that the total unit cost would be around 2,250 baht, a figure somewhere in between the two estimates given in table 11.

TABLE 12. Recurrent expenditure per student by university (including administrative expenditure)

	1954	1959	1964
<i>Chulalongkorn</i>			
Recurrent expenditure ('000 baht)	15 131	22 375	33 140
Enrolment	3 367	5 894	6 299
Recurrent expenditure per student (baht)	4 494	3 796	5 261
<i>Thammasat</i>			
Recurrent expenditure ('000 baht)	11 386	9 200	16 613
Enrolment (full-time equivalent)	2 550	2 183	2 694
Recurrent expenditure per student (baht)	4 465	4 214	6 167
<i>Kasetsart</i>			
Recurrent expenditure ('000 baht)	10 218	10 376	16 829
Enrolment	757	1 519	2 359
Recurrent expenditure per student (baht)	13 498	6 831	7 134
<i>Medical science</i>			
Recurrent expenditure ('000 baht)	22 265	26 772	62 881
Enrolment	1 616	2 620	3 377
Recurrent expenditure per student (baht)	13 778	10 218	18 620
<i>Silpakorn</i>			
Recurrent expenditure ('000 baht)	289	982	5 406
Enrolment	79	235	474
Recurrent expenditure per student (baht)	3 658	4 178	11 405
<i>Chiang Mai</i>			
Recurrent expenditure ('000 baht)	—	—	9 100
Enrolment	—	—	296
Recurrent expenditure per student (baht)	—	—	30 743
<i>Khon Kaen</i>			
Recurrent expenditure ('000 baht)	—	—	3 100
Enrolment	—	—	109
Recurrent expenditure per student (baht)	—	—	28 440
TOTAL			
Recurrent expenditure	59 289	69 705	147 069
Enrolment (full-time equivalent)	8 369	12 451	15 608
Recurrent expenditure per student (baht)	7 084	5 599	9 423

TABLE 13. Recurrent expenditure per student, by faculty, 1964 (excluding administrative expenditure)

University and faculty	Total recurrent expenditure (million baht)	Enrolment	Recurrent expenditure per student (baht)
<i>Chulalongkorn</i>			
Education	3.0	807	3 717
Commerce	2.0	1 002	1 996
Political science	2.0	653	3 063
Engineering	4.9	1 342	3 651
Science	8.7	1 228	7 085
Architecture	1.7	371	4 582
Arts	4.9	616	7 955
Seato graduate school of engineering	1.0	280	3 571
<i>Thammasat</i> ¹			
Political science	1.2	203	5 911
Economics	1.0	180	5 556
Law	1.1	699	1 573
Commerce	1.1	760	1 447
Social welfare	1.4	281	4 982
Public administration	2.3	221	10 407
Liberal arts	2.6	350	7 428
<i>Kasetsart</i>			
Agriculture and animal husbandry	6.9	1 159	5 953
Veterinary science	1.4	97	14 433
Economics	1.4	485	2 887
Forestry	1.5	281	5 338
Fishing	0.9	127	7 087
Irrigation	0.02	210	95
<i>Silpakorn</i>			
Painting	0.6	113	5 310
Decoration	0.4	101	3 960
Architecture	0.5	150	3 333
Archeology	0.4	110	3 636
<i>Medical Science</i>			
Siriraj hospital	12.9	519	24 855
Chulalongkorn	9.6	356	26 966
Dentistry	3.8	203	18 719
Pharmacy	2.0	79	25 316
Medical Science	3.4	606	5 611
Nursing School	2.5	580	4 310
Tropical medicine and graduate school	2.2	115	19 130
Chiang Mai medical school	12.2	216	56 481
Public health and medical techniques	1.0	56	17 857
<i>Chiang Mai</i>			
Science	—	146	—
Humanities	6.2	74	29 946
Social	—	76	—
<i>Khon Kaen</i>			
Engineering	1.3	59	11 927

1. Enrolment figures per faculty are corrected with an average attendance ratio to arrive at full-time equivalent figures.

TABLE 14. Recurrent expenditure per student (excluding administration) by purpose and by university, 1954-1959-1964

University and year	Salary and wages		Material & equipment		Welfare		Scholarships		All purposes	
	Total ¹	Per student ²	Total ¹	Per student ²	Total ¹	Per student ²	Total ¹	Per student ²	Total ¹	Per student ²
<i>Chulalongkorn</i>										
1954	7,809	2,319	5,747	1,707	402	119	1,173	348	15,131	4,494
1959	16,608	2,818	5,219	885	541	92	7	1	22,375	3,796
1964	26,900	4,271	5,500	873	740	117	0	0	33,140	5,261
<i>Thammasat</i>										
1954	3,274	1,284	7,783	3,052	329	129	—	—	11,386	4,465
1959	6,368	2,917	2,388	1,093	444	204	—	—	9,200	4,214
1964	12,200	4,529	3,500	1,448	513	190	0	0	16,613	6,167
<i>Kasetsart</i>										
1954	5,353	7,072	2,099	2,773	179	236	2,587	3,417	10,218	13,498
1959	6,334	4,170	3,371	2,219	176	116	495	326	10,376	6,831
1964	10,600	4,493	5,900	2,501	229	97	100	43	16,829	7,134
<i>Medical Science</i>										
1954	3,240	2,005	12,182	7,539	674	417	6,169	3,817	22,265	13,778
1959	16,026	6,117	8,840	3,374	1,898	724	8	3	26,772	10,218
1964	38,600	11,430	23,200	6,870	1,081	320	0	0	62,881	18,620
<i>Silpakorn</i>										
1954	269	405	16	202	1	13	3	38	289	3,658
1959	546	2,323	428	1,821	0	0	8	34	982	4,178
1964	2,300	4,852	400	844	6	13	2,700	5,696	5,406	11,405
<i>Chiang Mai</i>										
1964	3,800	12,838	5,300	17,905	0	0	0	0	9,100	30,743
<i>Khon Kaen</i>										
1964	600	5,504	2,500	22,936	0	0	0	0	3,100	28,440
TOTAL										
1954	19,945	2,383	27,827	3,325	1,585	189	9,932	1,187	59,289	7,084
1959	45,882	3,685	20,246	1,626	3,059	246	518	42	69,705	5,599
1964	95,000	6,087	46,700	2,993	2,569	165	3,300	179	147,069	9,423

1. In thousands of baht. 2. In baht.

5. Institutions of higher education

Here the statistics are, in a sense, more exhaustive, since it has been possible to analyse the recurrent expenditure per student for each of the seven universities in the country. Tables 12, 13 and 14 summarize the results. First, however, some comments are necessary on the tables:

Table 12

The relatively high recurrent expenditure per student at Chiang Mai and Khon Kaen universities is due mainly to the fact that both universities were established very recently and have not yet attained an optimum use of staff and facilities.

The comparatively high figures for the medical science university are caused by a relatively high financial allocation for materials and equipment and a low student/staff ratio.

Unit cost figures shown for Thammasat university are estimates, based on full-time equivalent enrolment figures. This procedure was necessary because of the great proportion of part-time and evening students in this university. If the total registered enrolment had been used as a basis for computing the unit costs, the relevant figure for 1964 would have been as low as 66 baht.

Table 13

Unit cost figures seem comparatively high for the faculties of veterinary sciences, public administration, dentistry, tropical medicine, public health and medical techniques, as well as for the graduate school of engineering. Figures relating to Siriraj Hospital and Chulalongkorn Hospital are not comparable with the other data, since they represent a combination of expenditure for educational activities and operational costs of the hospital which could not be separated. The high figure for Chiang Mai Medical School can be explained by a low student/staff ratio in this newly established university.

The extremely low figure for the faculty of irrigation (Kasetsart) is caused by the fact that the budget (20,000 baht) includes expenditure on materials and equipment only, since most of the teaching staff is borrowed from other faculties and their salaries are thus not included in this faculty's budget.

Table 14

The rising trend of the allocation per student for salaries and wages (of both teaching and administrative staff), from an average of 2,383 baht in 1954 to 6,087 baht in 1964, is noticeable in all universities except Kasetsart. This rise is partly due to an official salary increase of 20 per cent over the period under review, and partly to a decreasing student/staff ratio.

The unit expenditure figures for 'material and equipment' are hardly comparable between the three years, since they also cover investments in more durable equipment; sufficient data to compare five-year average figures were not available.

A later section will examine the policy implications of this analysis of unit recurrent costs; but first we must attempt to analyse capital costs.

II. Analysing capital costs

It is clear that one cannot go very far in analysing capital unit costs on the sole basis of budgetary sources.¹ In fact, it is doubtful whether average capital expenditure per pupil enrolled is even a meaningful concept, if it relates total annual capital expenditure to the total number of enrolments. More appropriate concepts and more refined data are needed to make an analysis of capital unit costs.

The present section is essentially concerned with the *unit cost per new place* at different levels and types of education, distinguishing between land, construction and equipment costs. But first, let us start with an accepted set of definitions.

A useful distinction can be made between net, additional, gross and consolidated costs. 'Net cost' includes elements that are common to all buildings, regardless of situation, whereas 'additional cost' consists of items which may vary according to the site of the school, for instance the cost of drainage or of boundary walls. 'Gross cost' is the sum of net and additional cost, and 'consolidated cost' is the sum of gross and land cost. A fuller definition of these terms is given in appendix III.²

A. Primary education

The information available includes lower primary schools (grades 1 to 4) only. Although, from an administrative point of view, upper primary (grades 5 to 7) is considered part of the first level, it seems more appropriate, when considering the problem of building design and construction, to include them with the secondary level, in view of the diversification of subjects and the change in the organization of teaching taking place at this stage. The following analysis is, therefore, limited to buildings for grades 1 to 4, although it is likely that, with the extension of

1. The available documentation is not systematic and is rather uneven. There is a large amount of information about primary education (in the Ministry of education) and on vocational/technical education (in 'Report on the proposed loan project for vocational education'). Data on secondary general education are rather scarce (in Ministry of Education, *Current and projected secondary education for Thailand*, Bangkok, Educational Planning Office, 1966) and there is no information available on higher education.

2. This distinction is frequently used in analysing school building costs. See the case study of school building costs in the U.K., in this series, volume III.

compulsory education to grade 7, it will become necessary to construct primary school buildings for all seven grades.

1. Land

Table 1 of appendix III shows the average size of primary school sites in urban and rural areas for three sizes of schools, while table 2 indicates the estimated cost of land, which is likely to vary considerably in different areas, particularly between cities.

On the basis of these tables, the cost of land per school and per place in 1965 can be estimated as shown in table 15.

TABLE 15. Cost of land per building and per place of primary schools (1965)

Type	Cost per school (baht)	Cost per place (baht)
<i>Rural areas:</i>		
A (525 places)	48 000 to 400 000	91 to 762
B (280 places)	80 000 to 320 000	286 to 1 143
C (105 places)	80 000 to 240 000	762 to 2 286
<i>Urban areas:</i>		
A (525 places)	2 400 000 to 2 880 000	4 571 to 5 486
B (280 places)	1 600 000 to 2 880 000	5 714 to 10 285
C (105 places)	1 600 000 to 2 880 000	15 238 to 27 428

These figures give only an approximate order of magnitude, but are of interest in view of the paucity of data available on the cost of land in Asian countries. For practical purposes, however, it should be borne in mind that in many cases the land necessary for constructing schools is donated, particularly in rural areas and in the case of primary schools. It is also likely that a number of schools are built on land which already belongs to the administration. For those reasons the actual expenditure on land and construction which appears in the budget of the Department of elementary and adult education refers primarily to construction.

2. School construction and furniture

The cost per place depends on the type of school and the method of construction,

TABLE 16. Space characteristics of primary schools

Kind of construction	Gross covered area including corridor (sq. metres)	Area per room (sq. metres)	Number of places	Area per place (sq. metres)
Type A: 2-3 storeys concrete and brick	1 147.5	76.5	525	2.2
Type B: 2 storeys concrete and wood	612.0	76.5	280	2.2
Type C: 1 storey, wood	216.0	72.0	105	2.05

as well as on the cost per square metre, which may vary by area. Table 16 describes briefly the characteristics of three of the fifteen types of building which are being used for primary schools in Thailand.

On the basis of table 16, (taking into consideration the differences between regions with regard to costs of construction), the net cost per place in 1965 would be as shown in table 17 in the central and north-east regions.

TABLE 17. Estimated net cost per place of primary schools

Kind of construction	Rural		Urban	
	Centre	North-East	Centre	North-East
Type A	—	—	4 620	—
Type B	1 980	1 980	1 870	1 980
Type C	1 025	880	1 025	990

In other words, the average net cost per place is around 4,600 baht for type A, 1,900 baht for type B and 1,000 baht for type C schools.

Additional costs seem to be considerably higher and are estimated at 5,000 to 20,000 baht for rural areas, and 20,000 (north-east) to a maximum of 150,000 baht (centre) for urban areas.

The cost of furniture has been estimated in table 18.

TABLE 18. Estimated cost of furniture in primary schools

	Rural area (baht)	Urban area (baht)
Pupil's seat	30	30 to 40
Pupil's desk	70	60 to 80
Other furniture per place (blackboard and teacher's desk)	25	30 to 35

The conclusions is that it is practically impossible to define a standard construction cost for a given type of school valid for the whole country. Much will depend on the extent of the additional facilities (such as playing fields, staff housing, etc.), which form the most expensive items and are not automatically provided.

It is nevertheless possible to relate the above information to the actual budgetary expenditures on capital items, since the number of schools built during the period 1961 to 1965 is available for each type of school per region (given in table 3 of appendix III). The net construction costs of this programme have been estimated in table 19.

The grand total for the five years 1961-65 (around 966 million baht) is rather impressive, considering that it does not include the cost of land, furniture or additional items. It corresponds to an annual average of 193 million baht, which is far above the capital budget of the Department of elementary and adult education, although the latter also includes a number of upper primary schools. For the

four-year period 1961 to 1964, this budget was 273 million baht or an average of 68 million baht per year. The large difference may be partly explained by the fact that voluntary contributions help considerably in the financing of school building construction.

TABLE 19. Estimated cost of the primary school building programme 1961-65 (million baht)

	Central	North	North-East	South
<i>Rural area</i>				
Type A	—	—	—	—
Type B	182.0	104.0	10.0	78.0
Type C	72.0	88.2	99.0	90.0
<i>Urban area</i>				
Type A	38.4	2.4	—	7.2
Type B	31.2	10.4	2.0	15.6
Type C	11.7	16.2	27.0	18.0
TOTAL	335.3	221.2	183.0	226.8

B. Secondary general education (grades 8-12)

Table 20 shows the average construction cost per place of three types of secondary school; the average cost is about 1,100 baht, or almost equivalent to the cost of a place in a primary school.

TABLE 20. Construction costs of secondary schools, 1965

Region	Type	Number of rooms	Capacity ¹ (number of places)	Total cost (baht)	Cost per place (baht)
Central	Wood	4	140	150 000-160 000	1 071-1 143
North	Wood	4	140	140 000-170 000	1 000-1 193
South	Wood	4	140	140 000-150 000	1 000-1 071

1. 35 places per room.

1. Sample survey

From a sample survey carried out among secondary school buildings all over the country the following points emerged: (i) concrete construction costs about twice as much as wood construction; (ii) variation in the geographic location of a building did not seem to make much difference to the cost of construction; (iii) land is usually donated.

An estimate of *additional costs*, providing facilities for 1,000 pupils, is as follows: cafeteria, 250,000 baht; staff housing, 400,000 baht; sanitation services, 30,000

baht; site improvement, 200,000 baht; total, 880,000 baht. The average additional cost per pupil place is therefore estimated at 880 baht. This would bring the total to about 2,000 baht per pupil place (excluding the cost of land and furniture) for wooden construction.

The Research Committee on Secondary Education in Thailand has estimated that concrete construction would cost about $\frac{365}{200} \times 2,000 = 3,650$ baht. per pupil place.

2. Comparison with macro figures

Since over the period 1961-64 the budget expenditure on capital items amounted to about 432.6 million baht, we may estimate that between 118,520 and 216,300 new places could have been built during that period.¹ Since the increase in enrolment in secondary general public schools amounted to only about 50,000 during this period, the number of new places seems relatively high, even if we assume that the provision of new places in private secondary schools, where enrolment increased by 40,000 between 1960-64, might have been partly financed by the government.

The cost estimates obtained from the sample survey can be compared with the budget figures. If we assume a depreciation period for wooden buildings of twenty years, the estimated per-pupil capital cost is 111 baht. For brick buildings, with an estimated lifetime of thirty-five years, the figure is around 104 baht. If we compare both figures with the per-student capital expenditure on public secondary schools of 90 baht in 1964, there seems to be a reasonable correspondence.

C. Vocational education

On the basis of data provided by the *World Bank loan project for the improvement of vocational education*, certain estimates can be made of the cost per place in vocational education. The costs of three planned schools, all based on a proposed capacity of 450 places, were taken as a more or less representative example and are presented in table 4 of appendix III.

These examples relate to schools of concrete construction with residential units. The average total cost per place for the three schools is about 25,200 baht; excluding dormitories, the cost per place would be about 21,400 baht.

It is interesting to compare the 'loan project' figures with certain standard designs for school buildings and standards for classroom and workshop space as used by the Ministry of education. A summary of these standards is given in

1. The number depends upon the type of construction:

$$\begin{array}{l} \text{Brick construction: } \frac{432.6 \text{ million baht}}{3,650 \text{ baht}} = 118,520 \\ \text{Wooden construction: } \frac{432.6 \text{ million baht}}{2,000 \text{ baht}} = 216,300 \end{array}$$

table 5 of appendix III. These cost standards are compared with the cost per place calculated in table 4 (appendix III) which shows that the cost figures from the loan project are considerably higher than those based on standards used by the Ministry of education. This would indicate that data from the loan project are not typical for all vocational schools in the country.

D. Teacher training

An example of the building cost of a teacher-training college (wooden construction) with a capacity of 550 seats is given in table 6 of appendix III. The estimated cost per place is about 5,000 baht, while the cost per place of a teacher-training college of concrete construction would be about 6,530 baht.

The average budget expenditure on capital items for teacher-training institutes in 1963/64 amounted to 17.1 million baht (budget figure). The number of new places built may thus be estimated at 3,420 to 2,610,¹ which compares reasonably well with an enrolment increase of 3,382 over the same period.

A comparison between the building costs at various levels of education is difficult in view of the great variety in types of schools and because of possible differences in definitions. The above figures would indicate that there is a very small difference in capital costs between primary and secondary general schools, but a very large difference between the latter and vocational schools. The cost per place depends largely on the type of facilities provided under additional costs; these are likely to be of relatively greater importance for a vocational school or a teacher-training institution.

The great variety of unit cost data presented so far illustrates the complexity of the relationship between unit cost and the variables which influence it. For example current costs per pupil are strongly influenced by pupil/teacher ratios and the qualifications of teachers, while capital costs per pupil are influenced by the physical characteristics of the school site and the method of construction. But what is the practical significance of unit cost data for the educational planner?

In the next section we shall examine more systematically one possible use of cost analysis, namely, to provide indices of the efficiency of educational systems through an examination of the recurrent cost per graduate for various types and levels of education.

1. $\frac{17.1 \text{ million baht}}{5,000-6,530 \text{ baht}}$

III. Recurrent cost per graduate

If there were no drop-outs or repetitions, the total recurrent cost per graduate could be calculated by multiplying the annual recurrent expenditure per student by the normal length of course in each type of education. However, as drop-out and repetition do exist, the recurrent cost per graduate is generally higher than such an estimate. One way of appraising the efficiency of an educational system or of different levels within the system is to compare the actual and the theoretical value of costs per graduate; the larger the difference between the two the less efficient the system, other things being equal.

A. The formulae used

Because of a lack of data, it has not been possible, when calculating the cost per graduate, to take into account the influence of pupils repeating a grade for one, two or more years. The recurrent cost per graduate has therefore been estimated for each type and level of education, taking into account only drop-out.

Since there was not sufficient information available for following a cohort through the educational system, it was not possible to calculate the exact number of years a pupil spends in a given type of education before graduating, but we can make a rather close estimate by using the equation:

$$RC_{g,y+n}^l = RC_p^l \times \frac{[E_{y+1}^{l,1} + E_{y+2}^{l,2} + E_{y+3}^{l,3} + \dots E_{y+n}^{l,n}]}{g_{y+n}^l},$$

where the relation in square brackets stands for the average number of pupil-years actually used, and:

$RC_{g,y+n}^l$ = Recurrent cost per graduate of level l in year $y + n$ (n = number of years that level of education lasts);

RC_p^l = Average recurrent cost per pupil for level l ;

$E_{y+1}^{l,1}$ = Enrolment in grade 1 of level l in year $y + 1$;

$E_{y+2}^{l,2}$ = Enrolment in grade 2 of level l in year $y + 2$;

$E_{y+n}^{l,n}$ = Enrolment in grade n (last grade) of level l in year $y + n$;

g_{y+n}^l = Number of graduates of level l in year $y + n$.

Theoretically the recurrent cost per pupil for each grade should be multiplied by the enrolment of that grade and then divided by the number of graduates, but insufficient data are available for this computation.

The fact that pupils are dropping out somewhere in the cycle before graduating does not mean that they should be considered a complete loss or wastage of resources. At each level of education we shall try to make a qualitative valuation of the drop-outs.

1. Primary level

Two types of primary school will be dealt with separately in this section: grades 1-4

(elementary grades) and grades 5-7 (complementary grades). The recurrent cost per graduate will be calculated for three years, 1954, 1959 and 1964.

TABLE 21. Enrolment in grades 1 to 4 (in 000's)

Year	Grade 1	Grade 2	Grade 3	Grade 4
1951	1 327			
1952		637		
1953			560	
1954				457
			(430 graduates)	

If we estimate that the recurrent cost per pupil (RC_p) for the cycle shown in table 21 is around 200 baht¹, the equation becomes:

$$RC_{g,1954}^1 = 200 \text{ baht} \times \frac{[1\ 327 + 637 + 560 + 457]}{430} = 1\ 386 \text{ baht}$$

This is 626 baht more than the cost if there had been no drop-outs. How serious a loss does this represent? If we assume that only after having graduated from grade 4 a child becomes literate and that a literate child is better equipped to absorb specific on-the-job training when entering the labour force, there clearly is a waste of resources due to drop-out.

A similar computation has been undertaken for the elementary cycle between 1956-60 by multiplying the actual number of pupil-years used by an adjusted RC_p of 230 baht. This gives $RC_{g,1958}^1 = 1\ 380 \text{ baht}$. Similarly, the recurrent cost per graduate in 1964 has been obtained by multiplying the actual number of pupil-years used by an adjusted RC_p of 260 baht. This gives $RC_{g,1964}^1 = 1\ 487 \text{ baht}$.

These calculations show that while the trend in unit cost per pupil shows a steady increase over the period 1954-64 (200; 230; 260), the recurrent cost per graduate was stable, if not decreasing, from 1954 to 1958 and increased by only 7 per cent from 1958 to 1964, as against a 13 per cent increase in recurrent cost per pupil over the same period. This is evidently due to the fact that the wastage rate declined during this period.

2. Grades 5-7

For the cycle starting in 1955 and ending in 1957, a similar calculation gives

$$RC_{g,1957}^2 = 313 \text{ baht} \times \frac{[86 + 81 + 74]}{69} = 1,092 \text{ baht}$$

$$\text{and } RC_{g,1964}^2 = 1,358 \text{ baht.}$$

1. This figure has been estimated by adjusting the unit cost figure obtained from budget data for 1954 to take account of the results of the sample survey.

If these figures are compared with those for grades 1-4, the recurrent cost per graduate from 1960 onwards is slightly lower in grades 5 to 7, due to fact that the incidence of drop-out is less in these grades.

The difference between actual and 'minimum' cost per graduate is 153 baht, 239 baht and 220 baht in the three years respectively; that is, an average of around 200 baht over the whole period. One should not attach more importance to these figures than they actually have; it is true that they give some indication of the cost of wastage, but only a very rough and crude one. If we take the case of those pupils who drop out after having completed grade 6, should we consider that they are equivalent to those who graduate from grade 4? Certainly not! To give but one example, experience shows that the former have better manpower prospects in the agricultural sector than the latter.

3. Secondary general level

Although it is difficult to present the recurrent cost per graduate for the two levels separately, since neither the budget nor the sample survey gives sufficient information, it is still necessary to make some attempt, even if the result is approximate because of the fact that after graduating from grade 10, only a small number of pupils (less than 30 per cent) continue in grade 11 of the academic stream, while the others go into the vocational/technical stream or teacher training or find employment.

Estimates for 1964 of the recurrent cost per pupil in secondary education, on the basis of the sample survey figures and the macro-data, are 750 baht for grades 8 to 10, and 2,800 baht for grades 11 to 12.¹ Similar estimates for other years have been arrived at.

The recurrent costs per graduate are calculated as follows:

(a) Grades 8-10 (enrolment in thousands)

$$(i) \quad RC_{g,1954}^4 = 564 \times \frac{[22 + 19 + 18]}{17} = 1\,957 \text{ baht}$$

$$(ii) \quad RC_{g,1959}^4 = 673 \times \frac{[58 + 55 + 51]}{49} = 2\,255 \text{ baht}$$

$$(iii) \quad RC_{g,1964}^4 = 750 \times \frac{[85 + 76 + 73]}{70} = 2\,505 \text{ baht}$$

(b) Grades 11-12 (enrolment in thousands)

$$(i) \quad RC_{g,1954}^5 = 2\,106 + \frac{[1.8 + 4.0]}{3.0} = 6\,177 \text{ baht}$$

$$(ii) \quad RC_{g,1959}^5 = 2\,512 \times \frac{[17.1 + 12.2]}{8.0} = 9\,194 \text{ baht}$$

$$(iii) \quad RC_{g,1964}^5 = 2\,800 \times \frac{[27.4 + 18.6]}{11.2} = 11\,508 \text{ baht}$$

1. These estimates are based on the unit salary cost of classroom teachers for grades 8-10, and of classroom and specialist teachers for grades 11-12, plus a per-pupil allocation of recurrent non-salary costs.

These estimates show that the recurrent cost per graduate of grades 8–10 has been increasing by about 28 per cent over the ten-year period 1954–64, while the recurrent cost per graduate of grades 11–12 has been increasing by more than 86 per cent for the same period; this increase is mainly caused by a growing incidence of drop-outs and examination failures in those grades.

The average cost per graduate of grades 11–12 during this period appears to be four times as high as that for grades 8–10, which justifies a separate treatment of the two levels. The difference between the minimum and the actual cost per graduate is 255 baht for grades 8–10 and 3,108 baht for grades 11–12.

4. Vocational/technical education

It is difficult to estimate the cost per graduate of this type of education, since the expenditure of the Department of vocational education covers vocational education at the primary level (grades 5–8, abolished after 1963), lower vocational education (grades 8–10), upper vocational education (grades 11–13), and technical education at the higher level (grades 14–16), as well as short vocational courses and vocational teacher training. On the other hand, information from the sample survey is limited to vocational schools covering grades 8–13.

Enrolment data per grade were available for all four types of vocational/technical streams, but only for the period 1959–63. The estimates of the cost per graduate were arrived at in the usual way; the cost per pupil was estimated from the outcome of the sample survey and the macro-data, while adjustments were made for the difference in levels of vocational education by using teacher salary cost per pupil in each grade as the main indicator of unit cost.

The results are as follows:

- (a) *Primary vocational stream* (grades 5–7, abolished after 1963)

$$RC_{g,1963}^6 = 7.2 \times 10\,000 \text{ baht} = 72\,000 \text{ baht.}$$

- (b) *Lower vocational stream* (grades 8–10)

$$RC_{g,1963}^7 = 4.4 \times 4\,400 \text{ baht} = 19\,360 \text{ baht.}$$

- (c) *Upper vocational stream* (grades 11–13)

$$RC_{g,1963}^8 = 3.9 \times 1\,000 \text{ baht} = 3\,900 \text{ baht.}$$

- (d) *Technical (higher) education stream* (grades 14–16)

$$RC_{g,1963}^9 = 4.3 \times 3\,500 \text{ baht} = 15\,050 \text{ baht.}$$

The above figures suggest one reason why the primary vocational cycle was abolished. The unit cost per graduate for the upper vocational stream is about one-third of the cost in equivalent grades of the academic stream. This is surprisingly low, even when we consider that 60 per cent of the total number of pupils in vocational/technical education are enrolled in grades 11–13 and that these grades are thus probably operating more efficiently than the under-utilized lower grades.

The RC_g of the lower vocational stream is high, mainly because of the high recurrent cost per pupil, which reflects the low pupil/teacher ratio at this level. In general, we may conclude that the considerable differences between RC_g of the different levels are to a large extent caused by the great differences in recurrent

costs, while the actual number of pupil-years does not differ considerably between the various levels (with the exception of the primary vocational stream).

5. Teacher training

There are four levels of teacher training: certificate (grades 11-12), diploma (grades 13-14), B.Ed. (grades 15-16) and M.Ed. (not included in the analysis). The unit cost data available from the macro-estimates include a mixture of all grades, and the data from the sample cover grades 11-14 only.

Estimates of RC_g have been made using a method similar to that applied in the case of vocational education. Enrolment data per grade were available for 1960 only.

(a) *Certificate level*

$$RC_{g,1964}^{10} = 2.2 \times 2\,000 \text{ baht} = 4\,400 \text{ baht.}$$

(b) *Diploma level*

$$RC_{g,1964}^{11} = 4.0 \times 2\,500 \text{ baht} = 10\,000 \text{ baht.}$$

(c) *B.Ed. level*

$$RC_{g,1964}^{12} = 2.4 \times 3\,500 \text{ baht} = 8\,400 \text{ baht.}$$

The fact that the RC_g at the diploma level is higher than the one at the B.Ed. level is caused by the high incidence of drop-outs at the former level.

6. University education

Since no enrolment figures by grade are available for years other than 1964 and 1965, the method used earlier is not applicable to this level of education.

The recurrent cost per graduate in each of the faculties in the various universities has been estimated in table 7 of appendix III. The figures in the table have been arrived at by multiplying the recurrent cost per student at each of the three degree levels (diploma, bachelor and master) (column 1) by the product (columns 4, 8 and 12) of the minimum number of years required to acquire a given degree (columns 2, 6 and 10) and by an adjustment ratio to take into account repetition and drop-outs (columns 3, 7 and 11).

In the absence of data for any period other than 1959-64, the drop-out rate has been estimated as follows:

(a) for diploma level (3 years):	$r_1 = \frac{\text{Enrolment first year: } 1961}{\text{Enrolment third year: } 1964}$
(b) for bachelor level (4 years):	$r_2 = \frac{\text{Enrolment first year: } 1960}{\text{Enrolment fourth year: } 1964}$
(c) for master level (5, 6-7 years):	$r_3 = \frac{\text{Enrolment first year: } 1959}{\text{Enrolment last year: } 1964}$

The average cost per graduate in 1964 has been estimated at:

$$RC_{g,1967}^{13} = 33\,100 \text{ baht for diploma level;}$$

$$RC_{g,1967}^{14} = 45\,500 \text{ baht for bachelor level;}$$

$$RC_{g,1967}^{15} = 63\,200 \text{ baht for master level.}$$

As was to be expected, the most 'expensive' graduates at both diploma and bachelor level are those in the faculties of medical sciences, science, agriculture and fine arts: the relatively 'cheap' ones are in the faculties of social and political sciences.

The above analysis suggests one possible use for calculations of recurrent costs per graduate at various levels of education, even when the estimates are based on very crude data. Trends in cost per graduate can provide one means of appraising the efficiency of various parts of the educational system, and this in turn may point to the need to find ways of improving it.

In the next section, we shall show how cost analysis can help appraise basic features of the Thai educational system. To do this, we will examine the case of separate individual schools and relate them to some general characteristics of the various levels of education in Thailand.

IV. Some indicators of cost-effectiveness for the Thai educational system

A. Primary education

Following the Compulsory Attendance Act of 1960, the Ministry of education was given the authority to extend compulsory education up to grade 7 and, as a first step, carried out a pilot programme in this field. One aspect of this programme was the 'Education extension project in Samutsonggram province' which appeared to be successful, according to an analysis made of enrolment by grade in 1964. It involved both the building of new comprehensive schools covering grades 5-7 and the construction of supplementary classrooms for existing grade 1-4 schools. Additional staffing with specialist teachers was also introduced. The policy was to provide either new construction for additional classrooms and specialist teachers for all schools which did not yet have grades 5-7, or to establish at least one comprehensive school (grades 5-7) in each district in order to absorb grade 4 graduates from all grade 1-4 schools in that district.

From a sample of ten grade 1-7 schools with specialist teachers in this province, it was estimated that in the average school (514 pupils, seventeen classroom teachers and four specialist teachers), the salary cost per pupil was 353 baht, and the recurrent expenditure per pupil (public expenditure only, excluding Unicef aid) 423 baht.

For the newly-built comprehensive schools, with an average of five classroom teachers and seven specialist teachers per school and an average enrolment of 293, the unit-salary cost was 423 baht and the total public unit expenditure 533 baht. These figures are respectively 25 per cent and 29 per cent higher than the

national averages for these types of schools (339 and 413 baht); this is due to the fact that the government has provided these project schools with exceptionally well-qualified teachers, sufficient specialist teachers, and an extra grant of 28 baht per pupil in grades 5-7 for expendable materials and administration costs.¹

If all grade 5-7 pupils enrolled in 1964 in primary schools in the kingdom had received an education of similar quality (i.e., with specialist teachers and a grant of 28 baht), this would have involved an extra annual expenditure of more than 25 million baht. This raises the question of how effective the additional expenditure was in the Samutsonggram province. One measure of effectiveness is provided by a comparison of the grade distribution of pupils in this province and in the country as a whole. In 1964, in the average government elementary school, 6.1 per cent of the total number of pupils in grades 1 to 7 were enrolled in the upper grades (5 to 7), but in the Samutsonggram province the proportion was 17.9 per cent. Furthermore, in this province 46.7 per cent of the total primary school enrolment in government schools were in schools offering the full cycle of primary education, against a national average of 15.4 per cent.

Another measure of the relationship between expenditure and effectiveness is provided by an examination of seven upper-primary schools (grades 5-7) in the Samutsonggram province in terms of space utilization of the school buildings.²

In table 22 the details of these schools are given in physical and monetary terms. The cost figures per classroom include the cost of furniture, amounting to 4,000-5,000 baht per classroom and consisting on the average of thirty-five sets of tables and chairs (3,500 baht), one teacher's table and chair (400 baht) and one blackboard (750 baht).

On average there were 32.6 pupils per classroom teacher and 83.6 pupils per specialist teacher in this type of school.

The number of pupil-places in the average school of ten classrooms is 350. Assuming that a single workshop provides thirty-five places and a double one seventy, we may estimate that the average grade 5-7 school has 400 pupil-places. Since the programme offered is similar for each pupil, it seems reasonable to assume a scheduling factor of 0.90, thus arriving at a total capacity of 360 pupil-places per school.³ Since the average enrolment per school is 280, the space utilization can be estimated at 77.8 per cent. In monetary terms, this means that while the average total building costs of classrooms and workshops is about 434,200 baht per school, or 1,206 baht per place, the cost per *occupied place* is 1,550 baht.

Assuming a wooden school has a lifetime of twenty years, this would mean a

1. The average qualification of a project school teacher is a certificate of education, whereas in the country as a whole only an average of 4 per cent of the teachers hold such a certificate.

2. These schools were built during 1963-64 in order to provide places for all grade 4 graduates in the province under the pilot project; it is for this reason that building costs could be estimated with a relatively high degree of accuracy.

3. The scheduling factor expresses the fact that even with the best kind of room scheduling it is almost impossible to have every potential pupil place occupied for every period of the school day.

TABLE 22. The cost of building seven grade 5-7 schools¹ Samutsonggram province (1963-64)

School	Enrolment grade 5-6 1956	No. of classes (35 seats each)	Enrolment per class (average)	Rooms built for			Average cost per room ³	Type ¹	Approx. cost	Total cost of building ²	Unit cost per pupil
				Class- room use	Other ² use						
1	248	9	28	9	3		39 250	Single	36 500	507 500	2 046
2	182	7	26	7	5		40 017	Single	32 800	513 000	2 819
3	376	13	29	13	3		40 813	Double	60 000	713 000	1 896
4	409	13	31	13	3		41 125	Double	55 000	713 000	1 743
5	275	9	31	9	7		31 469	Single	36 500	540 000	1 964
6	290	10	29	10	6		40 813	Double	60 000	713 000	2 459
7	177	6	30	6	2		39 000	Single	33 000	345 000	1 949
Average	280	10	20	10	4		38 927		44 829	577 786	2 064

1. Two-storey, wood.

2. Teacher's room, library, administration room, etc.

3. Although in principle the cost per classroom (6×9 m.) is budgeted at 40,000 baht, in reality these figures vary slightly because of the local situation. The figures are arrived at by subtracting the cost of the workshop from the total actual expenditure on buildings as given in column 9, and dividing these differentials by the total number of rooms built.4. Single workshop: 7×17.5 m. Double workshop: 7×35 m.

5. These figures are arrived at by adding the budget allocations for school building and the local contributions (in cash) for this purpose. The latter provided for the construction of libraries, footpaths, etc., to a total value of 70,000 baht for the seven schools over four years, an average of 2,500 baht per year.

'wastage' of almost 6,200 baht per school per annum, or the construction of five pupil-places.

This estimate excludes the cost of land, which amounts to about 100,000 baht per school. The annual 'wastage' in the utilization of land is estimated at 1,550 baht per school, thus increasing the total wastage to about 7,750 baht per school annually.¹

Another type of 'wastage' revealed by the sample is the fact that, out of a total building cost of 577,786 baht for the average school, an amount of about 116,700 (20 per cent) is spent on rooms for administration and teachers. This percentage seems rather high; it would mean an investment per pupil-place of 324 baht for this purpose.

B. Secondary education (academic stream)²

One of the most striking features is that the pupil/teacher ratio decreased from 25:1 in 1959 (which is considered normal) to as low as 17:1 for public and 18:1 for private schools in 1964. If measures to increase the pupil/teacher ratio to 25:1 again were to succeed, this would mean that in public schools the annual salary cost per pupil (80 per cent of the total unit cost) would decrease by about 30 per cent, or 300 baht.

For all secondary school pupils in public schools in 1964, this would involve a total saving of around 47.7 million baht or 30 per cent of the recurring budget of the Department of secondary education in that year. With such an amount it would have been possible to finance complete secondary education for around 3,400 pupils, or to increase the average annual salary of all public secondary school teachers by almost 50 per cent, or to employ better qualified staff.

Some general characteristics of the academic programme of secondary schools are given below. If these characteristics are assumed to apply to a more or less representative school from the sample, enrolling 247 pupils and employing ten classroom teachers and twelve specialist teachers, we may draw some conclusions about the internal efficiency of public secondary schools.³

1. In the academic stream the number of class hours per week is thirty, both in grades 8-10 and in grades 11-12. In grades 8-10 the curriculum differs very little from that of grades 5-7 of the elementary cycle: thai, four hours; social studies, four hours; science, three hours; health, two hours; arts, two hours; mathematics, five hours; english and practical arts either six or four hours each per week.

The curriculum organization of grades 11-12 is much more complicated:

1. The estimate of wastage assumes a 7 per cent interest rate for amortization.
2. This section relies heavily on information in *Current and projected secondary education for Thailand*, op. cit.
3. We have taken a rather small school (the national average secondary school has 358 pupils) in order to show the negative effect on unit costs of diseconomies of scale.

it is sub-divided into courses in science, arts and general studies, with twelve common required subject-hours per week at a higher level.¹

2. A second characteristic of secondary general education is the overloaded examination system:
 - (a) an entrance examination for grade 8 (national);
 - (b) final test for grades 8 and 9 (per individual school);
 - (c) final examination for grade 10 (national);
 - (d) final test for grade 11 (per individual school);
 - (e) final examination for grade 12 (national).

In order to pass an examination in the lower secondary stream, the pupil has to attend 75 per cent or more of the courses and score an over-all average of 50 per cent for the entire examination and not less than 25-35 per cent for four specified subjects.

A graduate from grade 12 gets a certificate if he scores at least a 50 per cent average for all subjects and at least 25 per cent in thai, english, social studies and mathematics. The above data explain the considerable amount of time spent by teachers and pupils on examinations (15-19 per cent of the total school hours).

3. Of the total number of teachers in public secondary schools in the kingdom, 98.4 per cent are on duty at a school: of these 86.6 per cent are teaching staff only; 7.2 per cent are principals or assistant principals; 2.5 per cent are combining teaching and administration; and 2.1 per cent are entirely involved in administration. Of the total average workload of secondary school teachers (26.7 hours), 16.7 hours are spent on teaching and almost ten hours (37 per cent) on clerical and library work.

Almost 6 per cent of all secondary school teachers teach subjects in which they have no specialization, while 15 per cent are not qualified.

4. Out of the total time scheduled for a school year of around 1,026-1,074 hours (180 days) an average of 24-392 hours (approximately sixty-four days or 35 per cent) are spent on activities other than classroom or laboratory work.
5. The usual pattern of organization is to have one boys' secondary school, one girls' secondary school, one boys' vocational school and one girls' vocational school in every provincial town. This must be borne in mind when analysing the space utilization of the sample school, and it partly explains the low rate of utilization of the school in higher grades, which is revealed below.

The sample school, which is in a rural area, consists of: (a) three grade 8 classes with an average enrolment of thirty-one per class and three classroom teachers, each having an average annual salary of 9,050 baht; (b) three grade 9 classes with an average enrolment of thirty-one per class and three classroom teachers with an average annual salary of 13,800 baht each; (c) two grade 10 classes with an average enrolment of twenty-five, and two classroom teachers with an average annual salary of 12,900 baht; (d) one grade 11 class with an enrolment of five and one classroom teacher with an annual salary of 13,200

1. In general studies, instead of eighteen specific subject-hours, there are six specific subject-hours and twelve elected subject-hours.

baht; (e) one grade 12 class with an enrolment of five and one classroom teacher with an annual salary of 14,400 baht. In addition, the school employs twelve specialist teachers at an average annual salary of 11,300 baht, plus a principal and an assistant principal with annual salaries of 26,400 and 19,200 respectively. The first point to note is that out of a total unit-salary cost of 1,227 baht a rather high proportion is spent on supervision and administration, namely, the unit salary costs of the principal, assistant principal and at least 3 per cent of all the teacher salaries, making a total of 216 baht, or 18 per cent of the total.

Furthermore, it may be estimated that in order to teach all grade 8-10 pupils (237) an average of 700 hours annually requires an expenditure consisting of the salary of eight classroom teachers (94,350 baht), plus an estimated 50 per cent of the total annual salaries of the twelve specialist teachers (67,800 baht), thus making a total of 162,150 baht or 232 baht per hour of instruction.¹ The annual cost of instruction per pupil-period would thus be almost one baht (162,150 baht/237 × 700).

If the percentage of school time spent on activities other than classroom work were lowered from 35 per cent to 15 per cent, and at the same time the percentage of the average workload of teachers spent on clerical and library work were reduced from 37 per cent to 15 per cent, it would be possible to provide around 900 hours of instruction per year (or 222-300 pupil-periods) for the same salary costs, and thus lower the annual cost of instruction per pupil-period to 0.72 baht (or 180 baht per hour for all grade 8-10 pupils). If this saving of 52 baht, or 22 per cent, per hour of instruction could be applied nationally to all secondary grades, it would certainly have far-reaching effects on the organization and productivity of the entire secondary school system.

In the case of grades 11-12 of the sample school, 7,000 pupil-periods of instruction are provided annually at a total salary cost of about 95,400 baht (around fourteen baht per pupil-period, as against one baht for grades 8-10). It is obvious that no school can afford this and that a re-distribution of these grades over the secondary schools operating in nearby towns is necessary to increase the number of pupils per grade to a minimum of fifteen. For the sample school such a measure would mean a reduction in the cost of instruction per pupil-period from fourteen to 4.5 baht.

Space utilization in secondary general schools can be analysed by using a combination of three types of data: (i) the actual data from the sample school; (ii) the results of a 10 per cent sample of all secondary schools in the kingdom carried out by the Educational planning office of the Ministry of education; (iii) the national standards.

In table 23 details are given of the physical and financial characteristics of the sample school. The number of pupil-stations is 400, that is thirty-five places in each of the ten classrooms and fifty pupil-places for the workshop. Since the programme offered is more detailed than in the case of primary schools, we may use a scheduling factor of 0.80 and thus arrive at a total capacity of 320 pupil-places. The

1. About 50 per cent of the grade 8-10 curriculum is taught by specialist teachers.

enrolment of the school being 247 in 1964 the space utilization is about 77.1 per cent in that year. This figure is somewhat lower than the percentage (77.6 per cent) found in the 10 per cent sample of the Educational planning office.

Excluding the cost of land (for which no data are available) the cost of building the classrooms and workshop of the school was around 90,000 baht, or 281 baht per pupil-place, as against a cost of 364 baht per occupied place. On an annual basis, assuming a lifetime of the building of twenty years for amortization purposes, this would mean a 'wastage' in 1964 of 1,280 baht for the entire school. This amount would be sufficient to construct four to five additional pupil-places per annum.

It may be noticed that the cost per pupil-place of the sample school in 1960 is considerably lower than the national standard of around 1,100 baht in 1964. Apart from a considerable increase in prices between 1960 and 1964 a possible explanation of part of the difference is that some parts of the school may have been built by the population itself, in which case the cost of manual labour would not be accounted for in the construction costs.

Another striking feature of the sample school is that while there are eleven rooms for purely instructional purposes (687 sq. metres, or 1.7 sq. metres per pupil-place) the other facilities (teachers' rooms, library, lunch room, etc.) cover nine rooms (1,008 sq. metres or 2.5 sq. metres per pupil-place). In monetary terms, this would mean that about 600,000 baht is spent on rooms other than classrooms and workshops.¹

The average ratio of three teachers per teachers' room could have been easily raised to seven per room, a saving of about 250 sq. metres or 150,000 baht, which is equivalent to the cost of building almost 140 additional 'standard' pupil-places (three classrooms).

TABLE 23. The cost of building a sample public secondary school (grades 8-12)

Type of construction	Purpose	Year of construction	Number of rooms	Average size per room (sq. m.)	Total building cost (baht)	Budget (baht)	Other sources (baht)
1-storey (wood)	Classrooms	1957	3	85	20 000	—	20 000
1-storey (wood)	Classrooms and workshop	1957	7	54	70 000	50 000	20 000
1-storey (wood)	Assembly hall and lunch room	1959	1				
2-storey (wood)	Teachers' rooms and library	1960	8	63	250 000	250 000	—
TOTAL					670 000	510 000	160 000

1. This figure was calculated on the basis of a cost of 600 baht per sq. metre, as observed in a wooden school built from budgetary sources around 1960.

C. Vocational/technical education

Of the total of 44,642 pupils in the 202 vocational schools in 1964, 11.7 per cent were enrolled in short-term courses, 11.5 per cent in lower and 62.4 per cent in upper vocational schools, 11.9 per cent in technical schools and 2.5 per cent in technical teacher-training colleges. The national average enrolment per school was 221 in 1964, with an average pupil/teacher ratio of 8:1, but there were considerable differences between provinces. For example, one province had only one vocational school of twelve pupils and twelve teachers, while another province had twenty-three vocational schools, 19,039 pupils and 1,540 teachers, accounting for almost 30 per cent of all vocational enrolment. Because of the regulation that every district should have at least one girls' and one boys' vocational school, forty out of the seventy provinces have two schools, in spite of the fact that the average enrolment in more than 50 per cent of those schools is below a hundred, with an average pupil/teacher ratio ranging between 1:1 and 6:1.

An attempt to examine the financial consequences of this national situation reveals the following features.

Out of the 1964 budget of the Department of vocational education (133.7 million baht), 49.6 million is spent on trade schools, 35.1 million on commercial and industrial schools, 26.8 million on technical schools and teacher training, 18.2 million on agricultural schools and 4.0 million on short vocational courses. Since we know that about 75 per cent of this total expenditure is allocated to teachers' salaries, the amounts spent on this item are, for the types of vocational education indicated above, respectively: 37.2, 26.3, 20.1, 13.7 and 3.0 million baht.

In dividing these figures by the total number of teachers employed in the different types of schools, we arrive at the following figures for average annual remuneration:¹ trade school teachers, 10,300 baht; commercial and industrial school teachers, 56,680 baht; teacher training and technical school teachers, 27,570 baht; agricultural school teachers, 34,860 baht; short course school teachers 14,000 baht. The salary cost per pupil for these various types of school is, respectively: 3,711 baht; 2,604 baht; 3,784 baht; 4,000 baht; and 2,720 baht.

The relatively low unit figure for commercial and industrial schools, in spite of a high average salary per teacher, is due to the exceptionally high average pupil/teacher ratio in this type of education, 21:1.

For the other types of education, the pupil/teacher ratios are: trade schools 5:1; agricultural schools 9:1; technical and teacher-training colleges 6:1; short courses 5:1. With the aid of the macro-financial data and the enrolment figures presented above, it is possible to analyse what would be the saving if all vocational schools in each province had a pupil/teacher ratio not lower than 15:1.² It would mean the saving of about 2,900 teachers.

1. The average annual remuneration of vocational school teachers, which is more than 28,000 baht, consists of a basic salary of 12,000 baht and allowances, various types of benefits and overtime payment amounting to 16,000 baht.

2. This was the average ratio in vocational schools around 1960. The fact that it is still considerably lower than the one in the academic stream of secondary education (25:1) is due to a higher percentage of specialist teachers in vocational schools.

The estimated annual salary cost of these teachers in 1964 was about 50 million baht,¹ i.e., almost 50 per cent of the recurrent budget of the Department of vocational education in 1964.

These savings would enable the present rather low allocation per pupil for materials and equipment (one of the major obstacles for a better development of this type of education) to be doubled from 500 baht in 1964 to around 1,000 baht in future years.

As far as the organization of the vocational education programme is concerned, the most striking feature is that while in the lower vocational stream (grades 8-10) the programme of thirty-five hours per week is somewhat different from the one in the lower academic stream,² in the upper vocational stream (grades 11-13) the programme of thirty to thirty-five hours per week is almost similar to the one in the upper academic stream. The number of class hours per week is identical for thai, english, social studies and mathematics, and in both streams there are an additional eighteen to twenty-three hours of vocational subjects per week. Whilst it is rather difficult to express the cost consequences of these characteristics, it is obvious that a considerable 'wastage' is taking place if one considers the completely different objectives of vocational and academic secondary education.

An examination of the teaching programme in the vocational stream shows the same characteristics as those in the academic stream, but they are more articulate.

1. The qualifications of teachers in vocational establishments vary considerably: 19.3 per cent have a bachelor's degree, 28.8 per cent a diploma and 17.5 per cent a certificate in education, while only 27.1 per cent have a vocational certificate and 7.3 per cent lower qualifications. It is estimated that about 41.6 per cent of all teachers do not possess the proper qualifications, while 7.8 per cent do not teach according to their specialization. Out of the total number of 4,122 teachers on duty³ in vocational schools, 75.7 per cent are teaching staff only, 7.8 per cent are principals or assistant principals, 9.3 per cent are combining teaching and administration, while 7.3 per cent are completely involved in administration.
2. The examination system of lower vocational schools is similar to the one in the lower academic stream. The examination system at the higher vocational

1. This amount was arrived at by weighting the average annual remuneration per teacher, as presented earlier, by the percentage distribution of teachers at present employed in the different types of schools, and assuming that the lowest qualified teachers would stop teaching at vocational schools.

2. Still two-thirds of the subjects overlap. The weekly number of hours required for english, science and arts is similar in both streams (nine to eleven hours); the time devoted to thai, social studies, mathematics and health is less in the vocational stream (nine hours, against fifteen hours), so that in the latter stream about seventeen hours are devoted to vocational subjects, as against four to six hours in the academic stream.

3. 1,104 teachers paid by the Department of vocational education are on leave or on loan to other institutions.

level is more complicated: each individual school is responsible for the examination and promotion of pupils in grade 11: a minimum average mark of 35 per cent in all academic subjects and 65 per cent in vocational subjects is required. In grade 12, there are two possibilities: (i) to obtain a grade 12 certificate in the academic stream, by obtaining a minimum score of 25 per cent in each of the academic subjects and a minimum average score of 65 per cent in vocational subjects; (ii) to promote to grade 13 on the basis of classwork together with a 35 per cent average for academic subjects and 65 per cent for vocational subjects in the final test of grade 12. In order to receive a certificate of grade 13, a pupil must attain a minimum average score of 65 per cent in vocational subjects and a minimum average score of 50 per cent for all subjects.

The emphasis on examinations is reflected in the time spent on this activity: seventy-one hours per year, or around 7 per cent of the total number of hours scheduled for a school year of 1,014 hours (169 days). Out of this total number of school hours, 286 hours (28 per cent) are spent on other than classroom and laboratory work, leaving 727 hours (121 days) for the latter.

3. Out of the total weekly workload of teachers in vocational schools (twenty-six hours), 55 per cent is devoted to teaching (fourteen hours) and 45 per cent (twelve hours) to administration, guidance, library work, etc.
4. The actual number of contact-hours per week of a teacher with his pupils, as based on an average class size of twenty-four and an average number of 15.9 teaching hours per week, i.e. about 380, as against an optimum of 500 hours (relative productivity 76 per cent).

The general characteristics indicated above will now be compared with the actual conditions in a more or less representative sample school in a rural area. In 1966 this vocational school, which only offered a course in building construction, covered grades 8-13. It had an enrolment of fifty-five and employed six classroom teachers (for six classes) and ten specialist teachers (pupil/teacher ratio 3.4:1). In previous years the average enrolment was around 250-300 because grade 4 graduates were enrolled in elementary vocational grades, but entry was later restricted to grade 7 graduates. As in many rural areas, there were not enough grade 5-7 classes to absorb all grade 4 graduates, so the number of new pupils applying for entry to the vocational school dropped heavily, while the number of teachers could not yet be reduced since they were still teaching pupils in the higher grades. This is an extreme case of a situation found in many rural areas in Thailand.

The six classroom teachers in the school taught the fifty-five pupils an average of fifteen hours per week (375 hours annually), while the ten specialist teachers taught them an average of fourteen hours per week (350 hours annually). The total annual number of teaching periods offered was thus 5,750, for a total annual salary cost of 179,100 baht or about 31 baht per teaching period.

The annual number of pupil-periods of instruction received was 39,875 (55×725) at a cost per pupil-period of about 4.5 baht.

The relation 31:4.5 baht is thus a kind of weighted pupil/teacher ratio of around 7:1. Improvements in the internal efficiency of the sample school would,

of course, reduce the cost both per period of education offered and per pupil-period of education received, though not necessarily at the same rate.

A reorganization of the school programme by raising the average number of periods offered from the present twenty-nine hours to thirty-four hours per week, (the average number of class hours theoretically required for the lower and upper vocational stream), would also imply that the percentage of time spent by pupils on other than classroom and laboratory work would have to be reduced from 28 per cent to 15 per cent, with the result that the total number of pupil-periods per year would increase from the present 39,875 to 55,550. This would represent a 29 per cent decrease in the annual average cost per pupil-period, from 4.5 to 3.2 baht.

Reorganizing the teaching programme would mean employing the same number of teachers at the same annual salary, but by raising the number of hours actually spent teaching from 55 per cent to 60-70 per cent, (eighteen hours for classroom teachers and sixteen hours for specialist teachers), the number of pupil-periods would rise from 5,750 to 7,960, causing a 24 per cent decrease (from 31 baht to 23.5 baht) in the annual average cost per teaching period.

Another form of 'wastage' is that in the sample school one principal and one assistant principal (total annual salary 49,800 baht) are in charge of supervision and administration. Since on average 9 per cent of the total teaching staff in vocational schools is also involved in administration, we may estimate the annual salary cost of administration and supervision to be about 66,000 baht or 1,200 baht per pupil (24 per cent of the total recurrent unit cost of about 5,000 baht in the sample school). This amount could be quite easily reduced by employing one full-time administrator (annual salary 10,000 baht) in addition to the headmaster, thus relieving all teachers from clerical work and re-employing the assistant principal in another educational establishment. The annual unit salary cost for administration would in that case be reduced to about 590 baht, a saving of 50 per cent.

Lastly, in appraising the space utilization of vocational schools, we shall make use of: (a) data obtained in a 10 per cent sample survey of all vocational schools in the kingdom, carried out by the Educational Planning Office; (b) data available from the World Bank Loan for Vocational Education Project (1967-71); (c) standard figures on area per pupil-place in vocational schools and on the average construction cost per square metre, provided by the Ministry of education; (d) data collected from the sample school, as presented in table 24.

In the sample school the space used for teaching purposes consists of six classrooms (486 sq. metres), providing a total of 180 pupil-places, and four workshops (1,579 sq. metres) providing an additional 120 pupil-places. If we correct the total number of 300 pupil-places by the average scheduling factor for vocational schools of 0.80, we arrive at a total comparative capacity of 240 pupil-places for the sample school. The space utilization, based on an enrolment of fifty-five in 1966, is thus around 23 per cent, a figure considerably lower than the 44.8 per cent average resulting from the 10 per cent sample. This is not surprising if we consider that the sample school was built for a normal total enrolment of 250-300 and was

originally offering more than one trade (in which case the workshops would have been more economically utilized). The cost per available pupil-place is at present 1,616 baht, or about 80 baht per year (based on a lifetime of a wooden school of about twenty years), while the annual cost of a utilized place in 1966 has been estimated at around 440 baht; an average of at least 276 baht per unit of capacity.

If we apply the more representative average space utilization of 44.8 per cent obtained from the 10 per cent sample to the national data, it follows that there

TABLE 24. Building cost of a vocational school (grades 8-13) offering a course in building construction in a rural area

Type of building	Purpose	Year of construction	No. of rooms	Size (sq. m.)	Total cost (baht)	Financed by	
						Budget (baht)	Contributions (baht)
One storey (wood)	Workshop	1940	1	256	2 200	2 200	—
One storey (wood)	Teacher's home	1940	1	77	600	600	—
One storey (wood)	Teacher's home	1940	1	63	400	400	—
One storey (wood)	Janitor's home	1940	1	27	300	300	—
Wood	Toilet	1940	1	12	300	300	—
One storey (wood)	Workshop	1941	1	256	2 500	2 500	—
Two stories (wood)	Dormitory	1944	4	148	483	—	483
Two stories (wood)	Dormitory	1952	4	243	100 000	100 000	—
Two stories (wood)	Dormitory	1957	4	270	200 000	200 000	—
One storey (wood)	Workshop	1958	1	770	60 000	—	60 000
One storey (wood + brick)	Workshop	1958	1	297	100 000	100 000	—
Two stories (wood)	Classrooms	1963	6	486	320 000	320 000	—
TOTAL					786 783	726 300	60 483

was in 1964 an unused capacity of at least 50,000 pupil-stations, in all vocational schools.

Applying the annual cost per pupil place as estimated for the sample school (80 baht) to this figure would imply an annual 'wastage' of about 4 million baht. This is certainly underestimating the actual annual cost of under-utilization of vocational school buildings; dormitories, libraries and other service buildings are also under-utilized, although probably to a lesser extent. The annual cost per pupil-place obtained from the sample (80 baht) seems a rather low estimate; an average cost of about 150 baht seems more realistic, in which case the total annual under-utilization would cost about 7.5 million baht.

Another point which may be observed in the sample school is that for teaching purposes an average space of 2.7 sq. metres per pupil-place is being used in classrooms, and one of 3.2 sq. metres in workshops. Both figures are almost 20 per cent higher than the national standards for classrooms and workshops used in building construction courses. The total 'wastage' in the sample school in terms of surplus space would thus amount to about 680 sq. metres, equivalent to space for almost 300 pupil-places, and thus to an annual 'wastage' of about 24,000 baht.

The dormitories in the sample school, providing accommodation for 130 pupils, had a utilization ratio of about 42 per cent in 1966. This under-utilization is estimated to cost about 8,700 baht annually.

Thus, if we assume that the utilization of teachers' and janitors' houses was not affected by the low enrolment, we may estimate that for the sample school the total 'wastage' caused by the three components discussed above amounts to almost 100,000 baht annually, or more than one-third of the total recurrent budget of the school in 1966.

Although the sample school definitely represents an extreme situation, it may be safely assumed that a more or less similar degree of under-utilization of school buildings occurs in almost all ninety vocational schools of the kingdom having an enrolment of a hundred or less. An estimated annual 'wastage' caused by the under-utilization of vocational school buildings of 10 million baht annually may, therefore, be considered conservative.

V. Conclusion

At the end of this case study, the reader may ask what real contribution it makes to educational planning and administration.

A first, simple answer is that the results of this cost analysis constitute the basic information needed for costing the physical targets of Thailand's educational plan and helping to assess the financial feasibility of the plan. This is dealt with in

another case study forming part of this same IIEP research project.¹ For the moment it is sufficient to say that this report studies the trend of unit cost in Thailand over a period of ten years; it shows how recurrent unit costs vary by level and type of education and by purpose of expenditure; it gives indications on economies of scale and on the effects of localization of schools (urban/rural); furthermore, it introduces an interesting distinction between capital costs (net, additional, gross and consolidated costs). All these elements are undoubtedly essential in preparing the costing of a plan and in testing its feasibility.

Apart from these obvious contributions which one would normally expect from cost analysis studies, four major conclusions arising from this report may be useful to different categories of specialists working in the field of educational planning.

1. The first conclusion could be considered as 'a rule of behaviour' and a 'warning' to *potential users of cost data*; the study shows clearly that cost analysis could not be done without relating it to the concrete situation of the educational system examined. For example, it would be a mistake to add the cost of land in assessing the cost of building a primary school in rural areas when the land necessary for constructing a school is donated or already belongs to the administration; furthermore, an analysis of recurrent unit costs in secondary schools would be meaningless without bearing in mind that there are five types of schools at this level in Thailand, and that a distinction must be made between them. For example, in private non-subsidized secondary schools, recurrent cost per pupil is two-thirds of that in rural secondary schools. In short, the administrative and financial aspects of the system are a pre-requisite step for making any meaningful cost analysis.
2. The second conclusion relates to the statistical data used. As clearly demonstrated in this report, cost data obtained from macro-sources (mainly budgets) have severe limitations, and without supplementing them with cost statistics obtained from sample surveys one can hardly go very far in analysing educational costs. To take but one example, 40 to 50 per cent of non-salary recurrent cost per pupil in vocational education is financed by donations, fees and income from the sale of pupil-made products and is, therefore, not included in the estimation of unit costs based only on macro-data. Sample school surveys alone can provide estimates of such elements, and thus ensure greater accuracy in cost data.
3. It is obvious that expenditure per-pupil is not a reliable indicator of educational efficiency; a decrease in unit costs with a simultaneous increase in wastage rates may well be due to inefficiencies in the educational system. This is why the 'cost per graduate' is a better index of efficiency than the 'cost per pupil'. In this respect the report, by examining the 'cost per graduate', makes a first attempt to analyse educational efficiency. The method used is far from perfect, mainly because of the lack of data on pupil flow; nevertheless, the conclusions

1. See page 265.

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reached are extremely helpful not only for appraising past trends in educational efficiency, but also in suggesting ways for improving efficiency.

4. Last but not least, the report demonstrates to planners and educational administrators the usefulness of cost analysis as a tool for decision-making, by studying some important features of the Thai educational system, showing the cost implications of these features, and pointing to possibilities of savings and increased efficiency. For example, the analysis of space utilization in school buildings clearly has important policy implications. This analysis of space utilization and of ways of increasing efficiency represents an interesting approach requiring no sophisticated data; the method is essentially simple and consists in examining in detail a sample of individual schools in relation to some general characteristics of the educational system in Thailand. Such a simple and straightforward approach could be applied advantageously in other countries.

Appendix 1

Educational system

The educational system of Thailand comprises pre-school, primary, secondary, vocational and higher education. The pre-school level includes kindergarten (from age 3) and pre-primary schools or classes (ages 5 and 6).

- (a) *Primary education* is divided into lower primary grades 1-4 and upper primary grades 5-7. Under the Education Act of 1921, all children who are 7 years old are required to attend school until the age of 15 or until they have completed *prathom* 4. Elementary education is free in public schools, but pupils have to buy textbooks and supplies. In the 1960 census, 71 per cent of the population from 10 years of age upwards were listed as literate. There are more than 5 million pupils enrolled in primary schools, of whom almost 48 per cent are girls.
- (b) *Secondary education* (general stream) is also divided into two levels: lower, grades 8-10, and upper, grades 11-12, with options in arts and science at the upper secondary level. The enrolment is about 312,000 in this stream.
- (c) *Vocational and technical education* is given at three levels: lower vocational schools (grades 8-10), higher vocational schools (grades 11-13) and technical institutes (grades 14-16). 45,000 pupils are enrolled in vocational and technical schools.
- (d) *Teacher training*: there are thirty-one teacher-training institutions (with about 22,000 students) distributed as follows:
 - (i) *teacher-training colleges* with a four-year programme leading to a 'Diploma in education' and qualifying for teaching in secondary grades. The first two-year programme leads to a 'Certificate in education', qualifying to teach at primary school level;
 - (ii) *teacher training schools* with a two-year programme leading to a 'Certificate of education';
 - (iii) *The college of education* with a regular four-year programme leading to the M.Ed. degree.
 - (iv) At *Chulalongkorn University*, after *maw saw* 5 (grade 12), students may either complete a four-year degree course in education or a three-year diploma course in education; they may also complete a degree in another group of subjects (e.g., sciences) and proceed to one year in the faculty of education to qualify as teachers.
- (e) *Higher education* includes universities, technical institutes and teacher education at degree level (college of education). About 52,000 students are enrolled in these institutions.

Appendix II

Administrative and financial aspects of the
Thai educational system

The estimating and analysis of educational costs need to be related to the administrative and financial aspects of the educational system involved. This appendix, therefore, gives some general details on administration, finance and expenditure in Thailand.

1. *Administration*

The structure of educational administration and planning in Thailand is rather complicated at both the central and regional levels.

(a) *Central administration*

The National Education Council (NEC), of which the Prime minister is president, has been assigned the main responsibility for policy-making in education and has a special administrative relationship with the universities, which are financed by the budget of the Prime minister's office. The Minister of education is chairman of the Executive committee of the National Education Council.

The Ministry of education is responsible for the provision of educational services (other than university education) to the community, in line with government policy as determined by the Council of ministers.¹

The Ministry is divided into nine departments, each with a separate budgetary allocation.

1. Office of the Under-secretary, which has the responsibility for over-all management of the Ministry, all its departments, provincial and regional offices, district offices and individual schools. It includes the Office of educational planning established in 1963;
2. Department of elementary and adult education, which is also responsible for pre-school education and education of handicapped children;
3. Department of secondary education, which also controls private schools at all levels in the country;
4. Department of vocational education, responsible for all schools at the three levels indicated above;
5. Department of teacher-training, which administers all the relevant institutions (except the faculty of education of Chulalongkorn University) and organizes in-service training. Before 1955 there was no distinct department, and teacher training was the responsibility of the Department of secondary education;
6. The Department of educational techniques, which gives professional assistance, particularly in the field of curriculum development, textbooks and teaching aids;
7. The Department of religious affairs;
8. The Department of fine arts, in charge of the observation of national arts and culture;
9. The Department of physical education, which organizes games, provides instruction in health and trains teachers of physical education.

1. A transfer of the administrative responsibility for primary schools to the Ministry of the interior is now in process (1967), but this does not affect the period under study.

Various other government departments have some responsibilities in higher and vocational education.

(i) *Higher education.*

By 1954 the following state Institutions of higher education had come into existence, and were, until 1959, directly under the control of different ministries:

- Chulalongkorn University
- Thammasat University (social sciences)
- University of Medical Science
- Kasetsart University (agriculture and veterinary science)
- Silpakorn University (fine arts)
- College of education.

Chulalongkorn, Thammasat (with a special statutory budget) and the College of education were under the jurisdiction of the Ministry of education, Medical Science under the Ministry of public health, Kasetsart under the Ministry of agriculture, and Silpakorn under the Ministry of culture. In 1959, the universities were transferred to the National educational council under the Prime minister's office, except for the College of education, which remained the responsibility of the Ministry of education, and the budgets of the universities, formerly scattered over the various ministries, were centralized.

(ii) *Specialized institutions.*

There is also a small number of specialized educational institutions run and financed by other ministries, such as the Schools for forestry, transportation, and chemistry, as well as the teacher college for nursing, which are under the responsibility of the Ministries of agriculture, transportation, industry and public health respectively. The Ministry of defence and the Police department also have their own institutions to meet their special needs.

(b) *Regional and provincial administration*

Thailand is divided into twelve educational regions. A regional education office serves several provinces as a co-ordination centre and a source of supervisory services. It includes representatives of the various departments in the Ministry of education and is responsible to the Office of the under-secretary for education.

Educational programmes are administered by seventy-one provincial (*Changwat*) education offices, which are the responsibility of the Office of the under-secretary and controlled by the Provincial governor. They handle matters of personnel and financing (record-keeping, disbursement of funds) and are responsible for the supervision of all schools in the province (including private schools).

The District (*Amphur*) education officer functions as a sub-division of the provincial structure and corresponds to a school inspector. He assists individual schools in administrative matters, and is responsible for collecting statistics, supervising the instruction and controlling the finances. There are 574 of them in the kingdom.

The sub-district or *Tambol* educational administration is controlled by two administrative branches, one responsible for the municipal schools and the other for the provincial schools.¹

1. Municipal schools include all schools situated in municipalities (main centre in each *Changwat*). There were 455 of them in 1964, spread over 120 municipalities in the kingdom.

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The municipal schools are under the responsibility of the mayor, through the Municipal board of education, but they get technical and financial assistance from the Ministry of education. Other local schools are the responsibility of the Provincial commissioner for education, with assistance from the local Board of education and the Provincial assembly.

Supervision is carried out by a network of regional and provincial (*Changwat*) inspectors in co-ordination with the supervisory units in the various operational departments of the Ministry of education.

2. Finance

A general picture of the financing of education in Thailand in 1964 is given in table 1. Two main sources (public and private) contribute 97.6 per cent of the total financial effort. External aid represents only 2.4 per cent (64 million baht).

(a) Public sources

(i) Method of financing

The overwhelming share of government income and expenditure in education (whether recurrent, capital or development expenditure) is accounted for in the central budget, regional and local authorities playing only a minor role in the financing process. The fiscal year, which used to correspond to the calendar year, was changed in 1961 to run from 1 October.

By far the major part of the expenditure of public educational institutions is accounted for in the budget of the Ministry of education, which also finances the regional and provincial administration of education. An experiment in decentralization was attempted during a brief period in the years 1957-58, when the provinces were allowed to prepare their own budgets and obtain the necessary subsidies directly from the Ministry of finance. After 1963 a more limited decentralization of schools in municipalities was attempted. Most of the municipalities were given the administrative responsibility for the operation of elementary schools in their area, which were financed partly by grants received from the Ministry of education (62.3 per cent of their total budget for teachers' salaries) and partly by their own resources. By 1964, 455 municipal schools out of a total of 24,600 primary schools were operating on this system; since the grants to them were included in the normal budget of the ministry, the analysis of expenditure is not affected in a material way. The ministry also gives subsidies to private schools under certain conditions.

The budget of the Ministry of education is supplied by the general revenue of the government. From 1953 to 1958 a Fund for Promotion of Education and Public Health, financed by a stamp tax, was put at the disposal of the Ministry of education for the building of schools and teachers' premises as well as the purchase of instructional materials. At present there is no tax or specific resource directly allocated to education.

During the period under review there was no loan, internal or external, for educational purposes.

(ii) Estimate of contributions

Figures concerning the financing of schools by the *Ministry of education* and by *other ministries* are readily available from the budget.

TABLE 1. Sources of financing, public and private schools, 1964

Source of financing	Public and private schools (million baht)	Percentage
1. <i>Public authorities</i>		
(a) <i>Central government</i>		
Ministry of education	1 673 ¹	64.4
Universities and NEC	232 ²	8.9
Ministry of finance	10* ³	0.4
Other ministries	13* ⁴	0.5
(b) <i>Municipalities</i>	29*	1.2
2. <i>Other national sources</i>		
Fees	500* ⁵	19.3
Voluntary contributions	50*	1.9
Other sources of university income	26	1.0
SUB-TOTAL	2 533	97.6
3. <i>External aid</i>		
Grants (cash or kind)	—	—
Technical assistance	64* ⁶	2.4
GRAND TOTAL	2 597	100.0

* = Estimate.

1. Excluding 76 million baht for religious activities, fine arts and sports, but including 74 million baht for subsidies to private schools.

2. Excluding medical services, consisting of subsidies to the Red Cross and operational costs of Siriraj Hospital.

3. Consisting of teachers' pensions (7 million baht) and scholarships (around 3 million baht).

4. Ministry of agriculture : 0.9 million baht, transportation : 0.9 million baht, industries : 0.6 million baht, health : 10.6 million baht.

5. Of which 27 million baht fees in public schools, the rest (rough estimate) in private schools.

6. Estimate of value to the recipient.

The financing of *public schools by municipalities* from their own resources, accounted for 29 million baht in 1964, or 37 per cent of the total expenditure of municipal schools of 76 million baht.

As for institutions of higher education, the central national budget contributes on average about 80 per cent of the institutions' expenditures.

Subsidies received from the Ministry of education by private schools amounted to 74 million baht in 1964.

(b) *Non-governmental sources of finance*

(i) *Method of financing*

Fees. In public *elementary schools*, education is free so that there is no income from fees.¹ At the *secondary level*, the registration fee is 100 baht; the annual fee is 160 baht at the lower level (grades 8 to 10); and 200 baht at the upper level (grades 11 and 12). In addition, there are special contributions which are spent on specific items such as library, lunches and sports. Receipts from fees are not accounted for in the central budget, but

1. Private institutions (elementary and secondary) are partly financed by fees from pupils.

are spent directly by each school. Approval of the department is however necessary for large expenditures and a school is not allowed to have at any time more than 3,000 baht in cash, the surplus to be deposited in the Ministry.

The annual fees per pupil in teacher-training institutions are 160 baht in lower grades, 200 baht in higher grades and 300 baht in the College of education.

The amount of fees received is spent on the acquisition of equipment, books and other instructional materials. Vocational schools are classified into six categories and fees vary from 100 to 250 baht, according to the classification assigned to each institution. Each school may apply to the Ministry of education to be placed in one or another of the six categories.

In practice, most vocational schools are in categories 3-4 (fees 100 to 150 baht), and technical institutes in categories 5-6 (200-250 baht). Income from fees is spent on the acquisition of material and equipment.

Fees also vary at the *higher level*. Examination fees are spent directly by each individual institution, without submission to the Ministry. Matriculation and general fees serve as a regular source of income of the universities, and are spent mainly on the acquisition of teaching equipment, books and furniture as well as on the restoration of buildings:

Voluntary contributions. Voluntary contributions from local communities for the construction and equipping of schools, particularly at the primary level, are received continuously. Normally, when an educational project which is to be financed by the community is initially accepted by the authorities, the government offers a counterpart of an equivalent amount. It is difficult to estimate the value of such local contributions, especially when they consist of the provision of labour or the donation of land.

(ii) *Estimate of contributions*

There do not seem to be any regular accounts for voluntary contributions towards the building of public schools. The latest comprehensive source of information is the 1960 report of the Ministry of education, which estimated them at about 44 million baht. The 1964 figure would be around 50 million baht.

The total income from fees in the public system would amount to 26 million baht. On the basis of hypotheses on the rate of fees per pupil, the income from fees in subsidized, non-subsidized and private schools, was estimated at about 388 million baht in 1964:

3. *Expenditure*

According to table 1, and considering only national resources to the exclusion of external assistance, the budget allocations by the Ministry of education and by universities constitute 92 per cent of the total finance of the public sector, and approximately 76 per cent of the total for public and private sectors. An analysis of the variations of global expenditure could therefore be limited to government expenditure.

Before examining the distribution of public educational expenditure by level and by purpose, it is useful to give the following indications of the trends of over-all public expenditures on education from 1954 to 1964.

1. The annual rate of increase at current prices was 9 per cent for the period 1954-59, 7.6 per cent for the period 1959-64 and 8.4 per cent for the whole period 1954-64. Annual figures show that this increase has been regular, due mainly to a great stability in budgetary allocations.
2. Taking the price deflator for GNP, the variations of public expenditure have been

TABLE 2. Public expenditure on education in relation to government budget and GNP

Year	Budget of the Ministry of education (m. baht)	Budget of universities and NEC (m. baht)	Total public expenditure on education (m. baht)	Total government budget (m. baht)	GNP (m. baht)	GNP p. capita (baht) ¹	Public exp. on educ. p. capita (baht) ¹	4 as percentage of 5	3 as percentage of 4	3 as percentage of 5
	1	2	3	4	5	6	7			
1954	904	— ²	904	4 192	34 557	1 570 (100)	41 (100)	12.1	21.5	2.6
1955	926	— ²	926	4 180	42 481	1 866 (119)	41 (100)	9.8	22.2	2.2
1956	955	— ²	955	4 647	44 203	1 885 (120)	41 (100)	10.5	20.6	2.2
1957	997	38	1 035	5 745	45 195	1 872 (119)	43 (105)	12.7	18.0	2.3
1958	1 202	81	1 283	6 013	47 021	1 890 (120)	52 (127)	12.8	21.3	2.7
1959	1 268	125	1 393	6 588	50 309	1 964 (125)	54 (132)	13.1	21.1	2.8
1960	1 237	121	1 358	6 516	55 717	2 111 (134)	51 (124)	11.7	20.8	2.4
1961	1 025 ³	112 ³	1 479 ³	5 655 ³	59 876	2 203 (140)	54 (132)	—	—	—
1962	1 466	161	1 627	8 156	65 209	2 329 (148)	58 (141)	12.6	19.9	2.5
1963	1 624	201	1 825	9 210	68 921	2 390 (152)	63 (154)	13.4	19.8	2.7
1964	1 749	268	2 017	10 379	74 738	2 516 (160)	68 (166)	13.9	19.4	2.7
1965	1 910	295	2 205	11 915	80 172	2 621 (167)	72 (176)	14.9	18.5	2.8
1966	2 094	410	2 504	15 055	92 231	2 927 (186)	78 (190)	16.3	16.6	2.7

1. Columns 6 and 7 have been presented for comparing the indices (1954 = 100).

2. Prior to 1957 the budgets of universities were included in the budget of the Ministry of education.

3. Reduced nine months budget from 1 January — 30 September.

estimated in constant prices; this gives a lower annual rate of increase: 6.7 per cent per annum over the period 1954-64.

3. Relating public expenditure in education to the national budget is particularly significant, since there is no other substantial public source of financing education. The share of education in the national budget is decreasing slightly (from 20.8 per cent in 1954-60 to 18.4 per cent during 1961-66). But if the budget of universities is added, it appears that expenditure on education receives the largest share from the national budget.
4. Relating educational expenditures to GNP shows that the proportion of GNP devoted to education was quite stable during the period (the lowest figure being 2.2 per cent and the highest 2.8 per cent, with no noticeable trend).

Table 2 gives an over-all view of the trend from 1954 to 1966.

(b) Distribution of public expenditure on education

(i) Distribution by level of education

Table 3 shows that the main changes in the distribution by level are a rapid increase in the share of higher education, a slight reduction in that of secondary education (which occurred between 1959 and 1964) and a decrease in that of the primary level. The larger share given to higher education can easily be explained by the enrolment explosion (8,371 students in 1954, 67,079 in 1964) and the creation of new institutions (Chiang Mai and Khon Kaen). In secondary education, the slight reduction which took place can be explained by an administrative change, namely shifting the responsibility for 'upper primary grades' from secondary to primary education. In spite of the decrease in the share of primary schooling, which is a common feature in all progressing systems of education, this share remains rather high, even in comparison with most Asian countries.

(ii) Distribution by purpose

Table 4 gives the distribution of public expenditures at all levels of education by purpose and calls for the following comments:

1. Teachers' salaries constitute about 70 per cent of total expenditures on education. The percentage is high for all levels and it would seem that, except for higher education, the percentage of recurrent expenditure on items other than salaries was reduced over the period 1959-64. This may be a matter of concern, considering that it reflects largely the limited availability of equipment and materials for schools.
2. An analysis of the distribution by purpose for each level shows that, except in the case of higher education, capital expenditure seems to constitute a rather low percentage of the total and tends to decrease over the period under consideration, even when taking the estimated voluntary contributions into account.
3. The proportion of expenditure devoted to central administration and common services, without being exceptionally high, is still important. A detailed analysis of this expenditure shows that about a third of the 116 million baht spent in 1964 was allocated to general administration at the central and regional levels.

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TABLE 3. Public expenditure on education by level¹

Level and type of education	Million baht			Percentage distribution		
	1954	1959	1964	1954	1959	1964
Central administration and common services	58.6	74.5	99.4	7.2	5.8	5.3
Pre-school education	n.a.	n.a.	8.1	n.a.	n.a.	0.4
Primary	546.5	812.9	1 115.7	67.4	62.9	60.1
Secondary	(162.7)	(358.6)	(362.8)	(20.0)	(22.3)	(19.6)
General ²	103.4	129.9	172.1	12.7	10.1	9.3
Technical and vocational	59.3	95.0	133.7	7.3	7.3	7.2
Primary teacher-training ³	—	66.2	58.0	—	5.0	3.1
Third level	(43.4)	(115.2)	(262.2)	(5.4)	(8.9)	(14.2)
Universities	43.4	115.2	232.2	5.4	8.9	12.6
Teacher-training ⁴	n.a.	n.a.	30.3	n.a.	n.a.	1.6
Out-of-school education	n.a.	n.a.	7.3	n.a.	n.a.	0.4
TOTAL	811.2	1 293.7	1 856.6	100.0	100.0	100.0

1. Budget of the Ministry of education and of universities.

2. Not including subsidies to private schools.

3. Training of teachers at the diploma level for 1964. All teacher training for 1959.

4. Training of teachers at B.Ed. level and above.

TABLE 4. Distribution of public expenditure at all levels¹ of education by purpose and percentage (million baht)

	1959		1964		All sources 1964	
	Budget	Percent-age	Budget	Percent-age	Estimate	Percent-age
Recurrent expenditure						
Central administration and common services	74.5	5.7	116.3	6.3	116.3	6.0
Maintenance and materials	88.1	6.8	148.8	8.1	166.9	8.6
Teacher salaries	895.4	68.7	1 303.4	70.9	1 303.4	67.4
Pensions	6.2	0.5	7.2	0.4	7.2	0.4
Transfer	91.5	7.0	22.6	1.2	30.6	1.6
SUB-TOTAL	1 155.7	88.7	1 598.3	86.9	1 624.4	84.0
Capital expenditure	148.1	11.3	240.6	13.1	308.1	16.0
GRAND TOTAL	1 303.8	100.0	1 838.9	100.0	1 932.5	100.0

1. Because data for teacher training were lacking for 1954, total figures could not be estimated for that year.

Appendix III

Definitions of capital costs in education

1. *Net cost* includes:
 - (a) school buildings, including built-in furniture and equipment; foundations and drainage (as far as and including the manholes immediately adjacent to the school);
 - (b) excavation and levelling for the buildings and the hard games area prescribed in the Building regulations;
 - (c) the construction and surfacing of the hard games area;
 - (d) any contingency sum allocated to the above;
 - (e) the proportion of preliminaries and insurances allocated to the above.
2. *Additional cost* includes:
 - (a) drainage works beyond the manholes immediately adjacent to the school;
 - (b) roads, paths and hard areas for informal games (other than the games area prescribed in the Building regulations);
 - (c) water, gas and electric mains (from meter point in building to connexion with the existing supply);
 - (d) site layout and planting;
 - (e) boundary walls and fencings;
 - (f) playing field preparation, including excavation;
 - (g) headmaster's and staff houses (including drainage);
 - (h) caretaker's house (including drainage);
 - (i) other unusual items, such as electricity sub-stations, sewage disposal plants, etc.;
 - (j) cycle sheds, greenhouses, etc. (if physically detached from the main school building or buildings);
 - (k) any contingency sum allocated to the above;
 - (l) the proportion of preliminaries and insurances allocated to the above;
 - (m) fees (e.g. fees charged by the Public works department for design and supervision of construction, or fees charged by a private architect).
3. *Gross cost* is the sum of net cost and additional cost.
4. *Consolidated cost* is the sum of the gross cost and land cost.
5. *Equipment* includes all non-expendable items of furniture and equipment not built in to the construction and not included in the net cost.

TABLE 1. Average size of primary school sites 1955-1960-1965

	Area in sq. metres								
	1955			1960			1965		
	Type A	Type B	Type C	Type A	Type B	Type C	Type A	Type B	Type C
<i>Rural areas</i>									
Central	9 600	9 600	9 600	9 600	8 000	6 400	8 000	6 400	4 800
North	9 600	16 000	16 000	9 600	9 600	9 600	9 600	8 000	6 400
North-East	9 600	16 000	16 000	16 000	16 000	16 000	9 600	16 000	16 000
South	9 600	8 000	6 400	9 600	8 000	6 400	6 400	6 400	4 800
<i>Urban areas</i>									
Central	6 400	4 800	3 200	6 400	4 800	3 200	4 800	3 200	—
North	9 600	9 600	9 600	9 600	9 600	4 800	6 400	4 800	4 800
North-East	9 600	9 600	9 600	9 600	9 600	9 600	9 600	9 600	9 600
South	9 600	9 600	9 600	8 000	6 400	4 800	6 400	4 800	4 800

NOTE The three types of primary school differ in size and method of construction as follows :

Type A : 2-3 storeys, concrete and brick, 525 pupil places

Type B : 2 storeys, concrete and wood, 280 pupil places

Type C : 1 storey, wood, 105 pupil places.

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TABLE 2. Estimated cost per sq. metre of land 1950-1960-1965 (baht)

	Land cost per sq. metre		
	1950	1960	1965
Central urban	250	400	500
rural	25	40	50
North urban	200	400	500
rural	10	15	20
North-East urban	100	200	300
rural	3	5	5
South rural	10	20	25

TABLE 3. Number of primary schools built in the period 1961-65

	Central	North	North-East	South
<i>Rural areas</i>				
Type B	350	200	20	150
Type C	800	980	1 100	1 100
<i>Urban areas</i>				
Type A	16	1	—	3
Type B	60	20	4	30
Type C	130	180	300	200

TABLE 4. Estimated construction cost of a vocational school 1965 (baht) (3 examples)

	Example 1	Example 2 ¹	Example 3
<i>Construction costs</i>			
Space for administration, classrooms and library			
classrooms and library	1 710 000	+ 10 %	1 710 000
Workshop	2 760 000	+ 10 %	2 280 000
Cafeteria	550 000	+ 10 %	550 000
Dormitories	1 704 000	+ 10 %	1 704 000
Staff housing	700 000	+ 10 %	700 000
Sanitation services	1 305 000	+ 10 %	1 305 000
TOTAL	8 729 000	9 602 000	8 249 000
Construction cost per place	19 398	21 338	18 331
<i>Other costs</i>			
Site improvements	400 000	400 000	1 240 000
Utilities	400 000	200 000	600 000
Equipment ²	500 000	500 000	500 000
Land	—	2 000 000	700 000
TOTAL	1 300 000	3 100 000	3 040 000
GRAND TOTAL	10 029 000	12 702 000	11 289 000
Total cost per place	22 287	28 226	25 088

1. Similar to example 1, but with 10 per cent increase due to geographic location.

2. The poor standard of equipment of Thai vocational schools is very well illustrated by the extremely low figure under this heading.

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TABLE 5. Cost per pupil place in 'loan project' vocational schools as compared with figures computed from official standards

Type of room	Sq. metres per pupil/ place (standards)	Cost per sq. metre (baht)	Cost per pupil/place (standards) (baht)	Cost per pupil/place (Loan Project) (baht)
<i>Classroom</i>	2.0-2.5	525-550	1 050- 1 375	
<i>Library</i>	2.0-2.2	500	1 000- 1 100	
			2 050- 2 475	3 800 (excl. dormitories)
<i>Workshops</i>				
Architecture and drawing	3		1 440- 4 200	
Dressmaking				
Electricity, metal work, etc.	7	480-1 400	3 360- 9 800	6 133
Mechanical engineer- ing, agriculture	9		4 320-12 600	—
Building	12		5 760-16 800	
<i>Dormitory</i>	5	675	3 375	3 790

TABLE 6. Construction cost of a teacher-training college, 1965 (550 places)

	baht	baht
<i>Construction costs</i>		
Space for administration, 10 regular classrooms, 6 special classrooms, library, etc.		1 600 000
Dormitories		500 000
Staff housing (10) at an average cost of 5,000 baht each		50 000
		2 150 000
<i>Other costs</i>		
Site	85 000	
Utilities	200 000	
Equipment	270 000	
Land (donated)	—	555 000
TOTAL COSTS		2 705 000

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TABLE 7. Average recurrent cost per graduate by faculty (1960-1967) (estimates)

Field of study	University	Diploma level				Recurrent cost per graduate (4 × 1) (1000 baht)
		Annual recurrent cost per student (1,000 baht)	Minimum required number of years	Adjustment ratio	Actual number of years	
<i>Humanities</i>						
Arts	Chulalongkorn	8.0	3	107	3.2	25.6
Archeology	Silkaporn	3.6	3	104	3.1	11.2
Education	Chulalongkorn	3.7	3	122	3.7	13.7
Fine Arts/Archt.	"	4.6	3	110	3.3	15.2
Thai Architecture	Silkaporn	3.3	3	111	3.3	10.9
Painting	"	5.3	3	114	3.4	18.0
Decorative Art	"	4.0	3	108	3.2	12.8
Soc. Sc.: Polit. Sc.	Chulalongkorn	3.0	—	—	—	—
" " " "	Thammasat	3.0	—	—	—	—
Law	"	1.2	—	—	—	—
Public. Admin.	"	9.0	—	—	—	—
Soc. Welfare	"	1.2	—	—	—	—
Commerce & Account.	Chulalongkorn	2.0	3	142	4.3	8.6
" " " "	Thammasat	1.5	—	—	—	—
Econ. & Bus. Admin.	Kasetsart	2.9	3	126	3.7	10.7
Engineering	Chulalongkorn	3.7	—	—	—	—
Irrigation Eng.	Kasetsart	0.1	3	187	5.6	0.6
Seato	Chulalongkorn	3.6	—	—	—	—
Science	"	7.0	3	130	3.9	27.3
Agr. & Anml. Husb.	Kasetsart	6.0	3	117	3.5	21.0
Forestry	"	5.3	3	108	3.2	17.0
Fisheries	"	7.1	3	113	3.4	24.1
Med. Sc. & Dent.	Med. Sciences	18.7	2	118	2.4	44.9
Medicine	Chulalongkorn	26.0	2	107	2.1	54.6
Medic. Tech.	Med. Sciences	17.9	3	120	3.6	64.4
Med. Science	" "	5.6	3	140	4.2	23.5
Pharmaceutics	" "	3.9	—	—	—	—
Trop. Medicine	" "	19.1	—	—	—	—
Nursing	" "	4.3	3	110	3.3	14.2
Sanitary Science	" "	25.3	3	109	3.3	83.5
Veterinary Sc.	Kasetsart	14.4	—	—	—	—
Medicine	Chiang Mai	56.5	3	124	3.7	209.1

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Bachelor level				Master level			
Minimum required number of years	Adjustment ratio	Actual number of years	Recurrent cost per graduate (8 × 1) (1,000 baht)	Minimum required number of years	Adjustment ratio	Actual number of years	Recurrent cost per graduate (12 × 1) (1,000 baht)
4	128	5.1	40.8	6	—	—	—
4	120	4.8	17.3	—	—	—	—
4	144	5.8	21.5	6	—	—	—
5	118	5.9	27.1	—	—	—	—
5	123	6.2	31.0	—	—	—	—
5	162	8.1	42.9	—	—	—	—
4	122	4.9	19.6	—	—	—	—
4	118	4.7	14.1	6	—	—	—
4	156	6.2	18.6	6	—	—	—
4	156	6.2	7.4	6	—	—	—
—	—	—	—	6	125	7.5	67.5
4	127	4.9	5.9	—	—	—	—
4	157	6.3	12.6	—	—	—	—
4	161	6.4	9.6	6	—	—	—
4	150	6.0	17.4	—	—	—	—
4	140	5.6	20.7	6	—	—	—
4	247	9.9	1.0	—	—	—	—
—	—	—	—	6	—	—	—
5	231	11.6	81.2	7	—	—	—
5	117	5.8	34.8	7	139	9.8	58.8
5	123	6.2	32.9	—	—	—	—
5	158	7.9	56.1	—	—	—	—
6	129	7.8	145.9	—	—	—	—
6	108	6.5	169.0	—	—	—	—
5	126	6.3	112.8	—	—	—	—
5	150	7.5	42.0	—	—	—	—
5	132	6.6	25.7	7	—	—	—
—	—	—	—	7	—	—	—
4	117	4.7	20.2	—	—	—	—
4	131	5.2	131.6	5	—	—	—
6	131	7.9	113.8	—	—	—	—
6	—	—	—	—	—	—	—

Thailand

8

The use of cost analysis in estimating
the total cost of an educational plan
and testing its feasibility

prepared by H.W. Reiff

The author, a Unesco expert in educational planning, was formerly at the Unesco Regional Office for Education in Asia, Bangkok, where he collected the basic data used in this case-study. The report was written with the help of Miss M. Woodhall of the IIEP Staff. Mr. P.H. Coombs and Mr. J. Hallak served as principal advisers to the study. The author and the IIEP gratefully acknowledge the assistance given by officials of the Thai Ministry of education and planning for their co-operation in the preparation of the study.

Introduction

An earlier case study in this series¹ produced estimates of the current and capital cost of different levels of education in Thailand, based both on official budget data and over-all enrolment figures, and on a sample survey of individual schools. It also attempted to calculate costs per graduate, taking account of wastage and stagnation. In the present case study, these estimates of unit costs are used to calculate the total capital and current expenditure required to achieve the enrolment targets set in the Educational plan for Thailand, 1967-71. The financial feasibility of the plan is assessed in the light of forecasts of available resources. Finally, some questions are raised about the allocation of resources between different levels of education in the educational plan, and some suggestions are made for utilizing the information obtained by an analysis of costs in assessing the relative priorities to be attached to different sectors of the educational system.

Thus, the case study demonstrates three ways in which cost analysis may prove helpful to the educational planner: (a) in preparing estimates of the total cost of an educational plan; (b) in examining the distribution of resources between different educational levels; and (c) in assessing the feasibility of a plan and, where necessary, in reformulating targets in order to achieve financial feasibility and reach as many as possible of the plan's original aims.

The first part of the study gives some brief background information about the preparation of the Thai educational plan and the formulation of its targets; the second part attempts to calculate the total cost of achieving these targets; the third part examines the financial feasibility of the plan in the light of these cost estimates and projections of sources of income; the fourth part provides a criticism of this method of setting and costing targets, and suggests ways in which analysis of costs can play a more active role in the process of setting plan targets. The conclusion attempts to draw some general lessons from this experience for other countries.

I. The educational plan for Thailand, 1967-71

A. The planning structure

Responsibility for formulating targets for the educational system in Thailand, for translating them into actual programmes together with detailed estimates of the cost of each programme, and for implementing these programmes, is divided bet-

1. See page 207.

ween a number of committees and ministries, under the general control of the Office of the Prime minister.

The broad aims of the development of the educational system in the five-year period 1967 to 1971 were first formulated by the National Educational Council (NEC). These aims were then translated into more specific proposals for different sectors of the education system by the Educational planning office, but they were still expressed in largely qualitative terms. Their translation into quantitative targets was a joint operation carried out by the Educational planning office (after consultation with the operational departments of the Ministry of education) and the Educational division of the National Economic Development Board (NEDB), which is the central planning agency, in consultation with the Manpower planning office. An important role was also played by the Bureau of the budget, which is responsible for drawing up not only the annual education budget, but also the National five-year development budget for education. The results of these complex consultative arrangements are presented in the National economic and social development plan (1967-71) which devotes a whole section to the educational system. However, when this plan was approved by parliament, the cabinet authorized the NEDB to make revisions of or adjustments to the plan each year.

This case study is concerned mainly with the original educational targets set by the plan, but the appendix gives details of the 1968 revisions, which were based on more accurate estimates of national income than were available in 1967 and also took into account the country's changed economic conditions resulting from a drought in 1967.

B. The general aims of the plan

The general objectives of educational development during the five-year period were stated as follows.

- (i) To provide education consistent with the economic and social development objectives of the country.
- (ii) To make provision for the expansion of education consistent with the government's social obligations and responsibilities, including educational opportunities for all children of school age.
- (iii) To achieve a more equitable balance by accelerating the qualitative improvement of regional or rural education.
- (iv) To promote the development of private education, particularly the improvement of its qualitative standards.
- (v) To effect qualitative improvements in course preparation and curriculum development, text books, school buildings and the qualification of teachers.

These very general aims were then expressed in slightly more specific terms as follows.

- (i) To provide educational opportunity for everyone at the compulsory school age, including an expansion of compulsory education at the upper

primary level, which will require (a) the provision of adequate school buildings, equipment and teachers, and (b) special attention to be paid to schools in overcrowded municipal areas and rural areas where attendance is a problem.

- (ii) To orient secondary education so as to satisfy occupational requirements (middle-level manpower) and to prepare the youth for citizenship, which will require (a) more comprehensive schools, (b) better vocational secondary education, and (c) improved educational guidance.
- (iii) To make qualitative and quantitative improvements in the training of teachers.
- (iv) To improve the quality of university education, especially in engineering, agriculture, medicine and natural sciences, (a) by establishing new universities in different regions of the country and expanding existing ones, and (b) by upgrading (not increasing) education at the social science faculties.

These general objectives were translated into enrolment targets and a number of specific educational projects, which are detailed in the next section.

C. Quantitative targets of the plan

Table I shows the 1971 enrolment targets set by the plan for each level of education, together with the increase between 1966 and 1971.¹ The greatest increases are in teacher training, technical institutes and universities, and upper secondary schooling. They are justified in the plan by the country's manpower needs, in the light of what was considered a realistic rate of economic expansion.

The first calculation of future manpower needs suggested that by 1971 there should be a total enrolment in secondary and post-secondary levels of 3.4 million pupils. However, in 1966 the enrolment at these levels amounted to only 0.45 million pupils. The plan therefore calculated what was called a 'best estimate' on the basis of past enrolment trends, with a slight addition to allow for some progress in meeting manpower requirements. This resulted in the target of 0.7 million pupils for 1971, shown in table 1.

In order to attain these targets, the plan proposed twenty new development projects and the continuation of twenty-eight on-going projects. These projects include the following:

- (a) *Kindergarten and lower primary education*
 - (i) Ten new kindergartens to be opened during the plan period.
 - (ii) 522,000 more pupils to be enrolled, requiring new schools, facilities and 15,000 new teachers.

1. Tables 4, 5, 6 and 7 in the appendix give the enrolment targets in greater detail, the estimated number of teachers required, and the targets for the number of graduates from the vocational, teacher-training and university levels.

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- (iii) More effective supervision; provisions for lending out textbooks; a grant system for writing materials.

(b) Upper primary education

The establishment of 500 upper primary schools in another 200 districts (in addition to the existing 1,771 upper primary schools in 500 districts).

(c) Secondary education (vocational stream)

- (i) The attraction of an additional 46,400 pupils to the vocational stream (of which 20,900 in engineering and 8,500 each in agriculture, commerce and home economics) through four main projects:
 1. *A World Bank Loan* of 437 million baht for the expansion of fourteen trade and industrial schools (planned enrolment increase: 2,100), of one vocational teacher-training college (planned enrolment increase: 270), of

TABLE 1. 1967-71 plan enrolment targets at various educational levels

Educational level	1966	1971	Absolute increase	Percentage increase
Kindergarten	75 376	113 250	37 880	50.2
Primary	4 768 000	5 504 000	736 000	15.4
Lower primary	4 231 000	4 753 000	522 000	12.3
Upper primary	537 000	751 000	214 000	39.8
Secondary-academic stream	345 500	575 700	230 200	66.0
Lower secondary	300 400	495 900	195 500	65.0
Upper secondary	45 100	79 800	34 700	76.9
Secondary-vocational stream	42 600	63 000	20 400	47.8
Lower secondary	5 600	7 100	1 500	26.7
Upper secondary	37 000	55 900	18 900	51.0
Teacher training	19 760	31 700	11 940	60.5
Certificate level	14 490	22 200	7 700	53.1
Higher certificate level	3 370	5 200	1 840	53.9
Degree level	1 900	4 300	2 400	126.3
Technical institute	8 460	19 090	10 630	125.6
University (Bachelor's degrees)	33 531	43 830	10 300	30.7
Humanities	1 615	4 150	2 540	157.2
Education	1 075	2 410	1 340	124.6
Fine arts	751	1 170	420	55.9
Social sciences ¹	20 477	19 700	- 780	- 3.8
Natural sciences	2 027	3 480	1 450	71.5
Engineering	1 961	3 640	1 680	87.6
Medical sciences	3 603	4 770	2 490	32.4
Agriculture	2 022	4 510	2 490	123.1
TOTAL	5 293 227	6 350 570	1 057 450	20.0

1. Approximately 7,000 Thammasat University students are expected to lose their student eligibility during the plan period.

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ten agricultural schools (planned enrolment increase: 2,380) and of one agricultural teacher-training centre (planned enrolment increase: 60); the total annual enrolment of these schools to rise to 11,900 in 1971.

2. *A project* to improve trade schools for girls; eight schools to come under this Unicef project, enrolling about 2,800 pupils per year with an annual expected output of 2,700.
 3. *A project* to improve twelve agricultural schools so that they can accept 2,000 more pupils each year and produce an average of about 3,800 graduates per year.
 4. *A project* to improve commercial schools: the extension of the programme of two commercial schools by two additional years and the establishment of one new commercial school.
- (ii) In addition, a vocational teacher-training college to be established, providing, a diploma in different trades, with a planned enrolment capacity of 650 and an expected annual output of 200 graduates.

(d) Technical education

A new technical institute will be added to the existing six institutes so that, during the plan period, an additional 10,630 pupils may be accepted. By 1971, the total enrolment at this level is expected to be around 19,090, while additional school buildings, equipment and teaching staff will be provided. The number likely to graduate from vocational and technical schools during the plan period is given in table 6 of the appendix.

(e) Private schools

The government will provide financial assistance to 400 private schools, thus making a total of 2,121 schools receiving financial assistance from the budget.

(f) University education

- (i) By 1971, the total university enrolment should be approximately 43,830 while during the plan period a total of 32,081 will graduate from universities. Details of this programme are given in table 7 of the appendix.
- (ii) New faculties of engineering, science and education will be established at Chiang Mai and Khon Kaen universities; Kasertsart university (originally including faculties in agricultural science only) will double its enrolment capacity and establish new faculties in fine arts, engineering and science; Chulalongkorn university will improve its engineering faculty through foreign assistance; and three new faculties will be added to the University of medical sciences.

(g) Teacher-training

- (i) During the plan period the following enrolment increases are expected: 7,702 at the certificate level, 1,882 at the higher certificate level and 2,440 at the degree level, leading to an expected increase in the totals at these levels respectively to 22,200, 5,200 and 4,300 by 1971.

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The planned increase in output of graduates during the plan period is: 31,950 lower certificate holders, 9,150 higher certificate holders, 1,320 vocational certificate holders, and 7,050 degree holders.

- (ii) Accelerated teacher-training programmes will be introduced if necessary, while 200 teachers will be trained for the comprehensive school programme.

(h) Adult education

During 1967-71 adult literacy will be increased by approximately 300,000 people; twenty-five training centres will be established and nine mobile vocational training units will be added to the existing two units.

(i) Miscellaneous projects

- (i) The establishment of five new welfare schools and the improvement of some hill tribe schools.
- (ii) The establishment of a national institute for educational reform and of a text bureau (through foreign assistance).
- (iii) Expansion in the use of educational radio and initiation of experiments in educational television.
- (iv) A serious tackling of the problem of shortage of qualified full-time instructors at the university level (30 per cent of the existing teaching force is part-time), a problem especially severe at the faculties of medicine and engineering.

II. Estimating the cost of the educational plan

The total development programme for education has been allotted 6,612 million baht, of which 5,500 million (or 83.3 per cent) are to be financed from the National plan budget, 287 million (4.3 per cent) from foreign loans, 290 million (4.3 per cent) from a loan by the Bank of Thailand, and 535 million (8.1 per cent) from foreign grants. The education sector is to receive 11.4 per cent of the total planned expenditure, reflecting the increased priority attached to education in the plan, since during the first plan period this proportion was only 7.4 per cent.

The 6,612 million baht allocated for educational development in the plan has been distributed among the different levels of education as follows: (i) primary education, 35.6 per cent; (ii) secondary (academic) education, 13.5 per cent; (iii) vocational/technical education, 15.3 per cent; (iv) teacher training, 7.3 per cent; (v) universities, 28.3 per cent.

This amount does not, however, represent the total cost of achieving the enrolment targets. It will cover some, but not all, of the capital expenditure; and the whole of the necessary current expenditure will have to be financed from other

sources. This section attempts to calculate the total capital and current expenditure required in order to fulfil the plan targets. These calculations necessitate, first, an analysis of some of the determinants of unit costs in Thailand and, secondly, assumptions about the development of private education.

A. Variables determining the trend of unit costs in Thailand

Table 1 of the appendix gives an estimate of the real increase in current expenditure per pupil for each level of education between 1959 and 1964, and the contribution of each of the components of current expenditure to this increase. It shows that at all levels there has been an increase in real expenditures per pupil, due mainly to an increase in the teacher salary cost per pupil, and to a lesser extent to an increase in real expenditure on materials and equipment, although expenditure per pupil on scholarships and social services showed a decline.

Since the greatest increase in per-pupil expenditure was in teacher salary costs, it is interesting to analyse this in a little more detail. One factor that determines teacher salary costs is the pupil/teacher ratio. An analysis of national figures for 1954 to 1964 shows that while these ratios increased slightly in public elementary and secondary schools and in teacher training, they declined in private schools and in higher and vocational education.

No radical changes are to be expected in the future. The increase of the school-age population, the public demand for more education, and the implementation of the seven-year compulsory education programme make a decrease in the pupil/teacher ratio unlikely. Indeed, an increase in the ratio in secondary schools would facilitate further expansion at this level.

Another important determining factor is the average level of teacher salaries. Table 2 shows the average annual salary of teachers by type and level of education in 1954-64.

TABLE 2. Average annual teacher salary by type of education 1954, 1959, 1964 (baht)

Type of education	1954	1959	1964
Primary (grades 1-7)	6 217	7 398	9 073
Secondary (grades 8-12)	10 134	12 059	14 742
Average primary and secondary	6 350	7 650	9 533
Teacher training	—	17 603	29 061
Vocational/technical	12 350	10 818	14 113
University	38 400	45 100	43 500

The average salary of primary and secondary school teachers rose by 46 per cent each in the period 1954 to 1964, which is slightly less than the rise in *per capita* income, which was 55 per cent in the same period. In 1964, the average salary of a primary school teacher was 3.8 times the *per capita* income and 1.9 times the average income per person in the labour force. Ratios for teachers in other levels of education range from 3:1 to 9:1.

The actual increase in the average salary of teachers is the result of changes in three factors: (a) the official salary scale, (b) the qualifications of teachers, and (c) their seniority. The official salary scale for teachers at all levels increased by 20 per cent between 1954 and 1964, simultaneously with an improvement in teacher qualifications. However, at most levels, actual teacher salaries rose less than indicated by these two factors taken together, which implies that the average seniority of teachers declined at all but the university level.¹

Teachers' salaries constituted the major part of current expenditure at all levels. In 1964 they accounted for 91 per cent of current expenditure at the primary level, 82 per cent at the secondary level, and 67 per cent in technical/vocational education. For 1980, the Draft Asian Model proposes a target of 80 per cent at the primary level, and 75 per cent at the secondary level. On the basis of the present level of teachers' salaries, the adoption of these targets would raise per-pupil expenditure from 261 to 300 baht at the primary level and from 1,005 to 1,164 baht at the secondary level.

In fact, there have recently been increases in non-salary expenditure. For example, a programme of free textbook distribution has recently been undertaken at a cost of 262 million baht. Such measures to increase the quality of education, or to increase social welfare expenditures on such items as school meals, are likely to raise considerable financial problems in the future. However, in the cost estimates that follow no substantial change is assumed in the balance between salary and non-salary costs.

B. Estimated current costs of meeting the plan targets

1. Pre-primary and primary education

The current costs of meeting the pre-primary enrolment targets for 1967 to 1971 have been estimated on the basis of the following assumptions:

- (a) the ratio between public and private school enrolment will remain constant at 33.5:66.5 per cent;
- (b) the pupil-teacher ratio, which was 20:1 in 1964, will increase to 30:1 as suggested in the plan;
- (c) teachers' salaries will increase by 4 per cent a year, i.e. 1 per cent less than the expected increase in *per capita* income; in the past, they have tended to lag about 1 per cent behind the annual growth in *per capita* income;
- (d) the observed increase of 0.5 per cent per year in the average salary per teacher between 1959 and 1964 due to increased qualifications will continue during the plan period;

1. See table 3 in the appendix, which shows the expected increase in teachers' salaries based on qualifications alone, and the actual increase between 1959 and 1964.

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(e) the relation between salary and non-salary costs will remain basically unchanged.

On these assumptions, the estimated current cost of the pre-primary enrolment targets laid down in the plan is as shown in table 3.

TABLE 3. Estimated cost of pre-primary enrolment targets 1967-71 (million baht)

Type of education	1967	1968	1969	1970	1971	Total
Public	22.0	22.9	23.8	25.1	26.2	92.6
Private	43.7	45.4	47.2	49.8	52.0	183.6
TOTAL	65.7	68.3	71.0	74.9	78.2	276.2

In order to estimate costs per pupil in primary schools, it is necessary to predict the distribution by grades. This was done by using population growth forecasts to predict first-grade enrolment, and then assuming certain drop-out and repeater rates. For example, it was assumed that the rate of promotion between grade 1 and grade 2 would improve by one per cent per year, from 77 per cent in 1967 to 81 per cent in 1971, and that the proportion of grade 4 pupils entering grade 5 would rise from 27.7 per cent to 31.7 per cent during the plan period.

Other assumptions were that :

- (a) the pupil-teacher ratio will reach 35:1 at the lower primary level, and 25:1 at the upper primary level, as laid down in the plan;
- (b) teachers' salaries will increase by 4.5 per cent a year, to allow for increases in the real salary per teacher and also for improvements in the qualifications of teachers;
- (c) there will be no substantial change in the price level for other goods and services, and the relation between salary and non-salary costs will remain unchanged;
- (d) the 1966 proportion of pupils in lower level private schools, 8.2 per cent, will remain constant;
- (e) at the upper primary level, the proportion of pupils enrolled in private schools will rise from 49 per cent to 50 per cent.

On the basis of these assumptions and observed unit costs in public and private primary schools, the current cost of the lower and upper primary school enrolment targets was estimated as shown in tables 4 and 5.

TABLE 4. Estimated cost of the lower primary enrolment targets, 1967-71 (million baht)

Type of education	1967	1968	1969	1970	1971	Total
Public	979	1 077	1 202	1 323	1 499	6 080
Private	85	94	105	115	130	529
TOTAL	1 064	1 171	1 307	1 438	1 629	6 609

TABLE 5. Estimated cost of the upper primary enrolment targets, 1967-71 (million baht)

Type of education	1967	1968	1969	1970	1971	Total
Public	101.7	118.7	130.9	152.1	173.1	676.5
Private	85.2	99.9	114.6	127.4	145.1	572.2
TOTAL	186.9	218.6	245.5	279.5	318.2	1 248.7

2. General secondary education

The following assumptions were adopted:

- (a) the balance between public and private school enrolment will be 50:50 per cent, compared with 52:48 per cent in 1964.
- (b) the recurrent expenditure per pupil is assumed to be about 1,000 baht in public and private secondary schools, and 1,300 baht in comprehensive schools.
- (c) the same assumptions about increases in teachers' salaries as were made for primary schools (see above).

These assumptions imply the following estimates for total current expenditure for the period 1967 to 1971: private secondary schools, 1,065.5 million baht; public secondary schools, 1,092 million baht.

3. Vocational and technical education

The cost estimates for secondary vocational education assume that the rate of increase in enrolment will decline with the planned expansion of comprehensive schools, but that the rate of increase of enrolment at post-secondary levels will be high.

Because of the high rate of repeating in vocational education, the cost of meeting the plan target for the number of graduates is considerably higher than the cost of attaining the enrolment targets. To attain the latter would cost 463.1 million baht, whereas the cost of attaining the former is estimated at 1,097.2 million baht.¹

4. Teacher training

As in the case of vocational education, two separate cost estimates have been made, one for attaining the enrolment targets, the other for producing the number of teachers necessary to meet the other enrolment targets and the planned pupil/teacher ratios. It was assumed that the qualifications of teachers in teacher-training colleges would rise as set out in the plan, which would mean a 2 per cent annual increase in teacher salary costs in addition to the 4 per cent aimed at increasing real salaries of teachers.

On the basis of these assumptions, and of 1966 estimates of per-student expenditure, it was estimated that the cost of attaining the enrolment targets would be

1. The planned number of graduates is shown in the appendix, table 6.

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433 million baht, but the cost of producing the planned number of graduates would be 534.9 million baht.¹ The fact that the latter is 24 per cent higher than the former reflects wastage and repeating at the teacher-training level.

5. University education

The cost estimates for the university level take into account observed differences in expenditure per student in different subjects, and an assumed increase in teacher salaries due to improvements in qualifications. Thus separate cost estimates have been made for each faculty, as shown in table 6. The total estimate of current expenditure required to meet the plan enrolment targets is 724.4 million baht.

TABLE 6. Estimated recurrent cost of realizing the enrolment targets in higher education 1967-71

Branch of study	Total enrolment target : 1967-71	Average cost per student (baht)	Total cost (million baht)
Humanities	10 615	8 252	87.6
Education	6 715	4 742	31.8
Fine arts	4 175	5 360	22.4
Social sciences ¹	50 000	2 600	130.0
Natural sciences	11 585	8 932	103.5
Engineering	11 480	5 600	64.3
Medical sciences	20 505	10 000	205.1
Agriculture	12 600	6 324	79.7
TOTAL	127 675		724.4

1. The enrolment at Thammasat university has been corrected by a factor 0.6, in order to arrive at an estimated full-time equivalent enrolment figure over the plan period. The unit-cost of this university has been based on a corrected student/staff ratio (full-time students per full-time teaching staff).

Once again, however, the cost of producing the planned number of graduates is higher because of the incidence of drop-out.² This gives a cost estimate of 1,140 million baht, which is more than 50 per cent greater than the cost of attaining enrolment targets.

C. Estimated capital costs of meeting the plan targets

When estimating the total capital cost of meeting the enrolment targets set in the plan, it is possible to make two different assumptions: (i) that every additional pupil will require new accommodation, or (ii) that existing buildings can be used more efficiently, so that space utilization rates may reach 100 per cent, instead of the present figures of about 75 per cent.

Estimates of the total capital cost of meeting the enrolment targets have been

1. The target number of graduates is shown in the appendix, table 5.
2. See appendix, table 7.

made using both these assumptions, in the latter case using the results of a recent survey of space utilization. This demonstrates clearly the considerable economies to be gained from a policy of increasing the space utilization of existing schools. Table 7 shows the total capital cost of meeting the plan enrolment targets on these two different assumptions about space utilization.

TABLE 7. Estimated total capital cost of meeting plan targets, 1967-71 (million baht)

Level of education	Existing rates of space utilization	With 100 % space utilization
<i>Pre-primary and primary</i>		
Public schools	741.2	555.9
Private schools	307.2	245.8
Sub-total	1 048.4	801.7
<i>Secondary</i>		
Public schools	246.2	} 355.8
Private schools	228.2	
Sub-total	474.4	355.8
<i>Vocational/technical</i>		
Cost of classrooms etc.	298.4	134.3
Cost of dormitories, etc.	298.4	134.3
Cost of land, equipment and utilities	275.5	123.9
Sub-total	872.3	392.5
<i>Teacher training</i>		
Cost of classrooms, etc.	71.8	} No information available on utilization rates.
Cost of dormitories, etc.	71.8	
Cost of land, equipment and utilities	47.9	
Sub-total	191.5	
<i>University</i>	326.0	

III. Testing the financial feasibility of the plan targets

The main sources of finance for the planned educational expansion in Thailand are as follows: (i) the annual budget of the Ministry of education, (ii) the plan budget, (iii) fees, (iv) voluntary contributions, (v) autonomous university funds. Projections of the amount available under the annual budget of the Ministry of education rest on assumptions about such factors as the future rate of growth of GNP and the proportion of GNP devoted to education. Total Ministry of education resources must then be allocated between different levels of education and the departments within the ministry that are responsible for each level.

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The plan's forecasts of educational resources were based on an analysis of past trends, together with the following assumptions:

- (a) GNP will increase at 8 per cent per year (the plan target);
- (b) total public expenditure on education will be 3 per cent during the plan period having risen from 2.3 per cent in 1954-57 to 2.7 per cent in 1963-66;
- (c) the Ministry of education budget will amount to 2.75 per cent per year of GNP, the remaining 0.25 per cent being devoted to university education and the educational expenditures of other government agencies;
- (d) the distribution of the Ministry of education budget between the various departments responsible for education will correspond roughly to the 1965 pattern, i.e.

(i) Department of elementary and adult education	65.0 per cent
(ii) Department of secondary education	15.0 per cent
(iii) Department of vocational education	7.5 per cent
(iv) Department of teacher training	4.5 per cent
(v) Administration and other expenses	8.0 per cent
	100.0 per cent

Tables 8 and 9 show the projection of GNP, public expenditure on education, the annual budget of the Ministry of education, and the distribution among the four main departments.

TABLE 8. Estimated growth of GNP and educational expenditure 1967-71

Year	GNP	Public expenditure on education	Budget of the Ministry of education
1967	84 562	2 537	2 325
1968	91 327	2 637	2 511
1969	98 633	2 959	2 721
1970	106 523	3 196	2 929
1971	115 046	3 451	3 164

TABLE 9. Estimated distribution of total Ministry of education budget 1967-71 (million baht)

	Total budget 1967-71
Department of elementary and adult education	8 873.0
Department of secondary education	2 047.5
Department of vocational education	1 023.7
Department of teacher training	614.3

In the light of these estimates of the resources available from the Ministry of education and the allocation of 6,612 million baht for education from the total development expenditure set in the plan, we can begin to assess the financial feasibility of the plan's enrolment targets for each level of education. The previous section gave estimates of both the current and the capital cost of meeting these targets. The purpose of this section is to calculate how much of this capital and

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TABLE 10. Projected sources of income and estimated current and capital costs of meeting enrolment targets, 1967-71 (million baht)

Income		Expenditure		Balance
Source	Amount	Type	Amount	
<i>Primary education</i>				
<i>1. Current</i>				
Budget of the Dept. of elementary and adult education (less 7% admin. costs)	8 252	Public schools	6 877	+ 1 375
Fees	605	Private schools	1 339	- 734
<i>2. Capital</i>				
National plan budget	1 899	(a) with 100 % space utilization	802	—
		(b) present level of space utilization	1 048	+ 851
<i>Secondary</i>				
<i>1. Current</i>				
Budget of the Dept. of secondary education (less 5 % admin. costs)	1 790	Public schools	1 092	+ 851
Fees (public schools)	153			
Fees (private schools)	344	Private schools	1 065	- 721
<i>2. Capital</i>				
National plan budget	741			
Dept. of secondary education budget	155	With present level of space utilization	475	+ 481
Voluntary contributions	60			
<i>Vocational and technical education</i>				
<i>1. Current</i>				
Budget of Dept. of vocational education (less 5 % admin. costs)	822	(a) Meeting enrolment targets	463	+ 408
Fees	49	(b) Meeting graduate targets	1 097	- 226
<i>2. Capital</i>				
National Plan budget	343	Cost of accommodation + dormitories + land	872	+ 460
Budget of Dept. of voc. education	154			
Foreign loans and grants	335			
<i>Teacher training</i>				
<i>1. Current</i>				
Budget of Dept. of teacher training (less 9 % admin. costs)	455	(a) Meeting enrolment targets	433	+ 42
Fees	20	(b) Meeting graduate targets	535	- 60

TABLE 10. Continued

Income		Expenditure		Balance
Source	Amount	Type	Amount	
2. Capital				
National plan budget	401	High estimate (present level of space utilization)		
Budget of Dept. of teacher training	104		191	+ 314
Universities				
1. Current				
Autonomous university budgets	610	(a) Meeting enrolment targets	724	- 39
Fees	75	(b) Meeting graduate targets	1 140	- 455
2. Capital				
National plan budget	1 553	Capital cost	326	+ 1 499
Foreign loans and grants	227			
University budget	45			

current expenditure will be covered by the estimated resources of the plan budget and the Ministry of education, to show how much will remain to be financed from private sources, and to estimate the resources for quality improvement.

The method that has been adopted is to make separate estimates of the amount available from the Ministry of education budget, fees and voluntary contributions, on the basis of recent trends in the growth of various sources of income and its distribution between current and capital expenditure and administration costs. These estimates, combined with the capital expenditure allocations in the plan budget, give an estimate of the total resources available for educational expansion at each level. This figure can then be compared with the costs of meeting the plan targets for both enrolments and number of graduates shown in the previous section. Table 10 summarizes this calculation for each level of education.

At the *pre-primary and primary* level, the projections of available resources appear to be adequate to cover current expenditure in public schools and to finance investment in new school buildings in both the public and the private sector, even if no increase in space utilization is achieved. However, the predicted income for private schools will not be sufficient to cover their current expenditure, unless there is either a considerable increase in the level of fees, which at present amount to 300 baht per pupil per year, or an increase in public subsidy.

Similarly, at the *secondary* level, there will be a shortage of resources in the private sector unless there is an increase in fees or in public subsidy, but there will be sufficient capital resources to build new accommodation for the increased enrolment and allow some quality improvement.

In *vocational and technical* education, projected resources are 88 per cent higher than the estimated current cost of meeting the enrolment targets, but 14 per cent lower than the cost of providing the planned number of graduates. Thus there will be resources available for some upgrading of teachers in vocational education,

or for an increase in the supply of equipment and materials, but unless measures are introduced to lower significantly the rate of wastage and repetition, without substantially increasing costs per pupil, it will be impossible to attain the targets for graduates with the resources available.

Similarly, in *teacher training*, the resources available will be sufficient to meet the enrolment targets, but not sufficient to meet the targets for graduates unless there is an increase in efficiency without a corresponding increase in cost per pupil.

At the *university* level, the estimated resources are 5 per cent lower than the cost of attaining the enrolment targets, but in view of the approximate nature of the calculations this is not a very significant difference. However, because of wastage and repetition, the cost of meeting the targets for graduates is considerably higher than the estimate of available resources, so that even if drop-out rates are reduced it seems unlikely that these targets will be attained.

At all levels of education, the projected capital resources will be sufficient to finance the necessary buildings for the increased enrolment, and at the university level the high priority attached to higher education in the plan budget will allow for considerable improvement in the quality of existing buildings and equipment, which is one of the main aims of the plan.

Thus, the enrolment targets set in the plan appear to be feasible in terms of capital requirements, but an increase in the level of fees charged in private schools, together with an increase in public subsidy to private schools, seem necessary if the current costs of increased enrolment are to be met. On the other hand, in the light of high rates of wastage, the current expenditure required to meet the target for the number of graduates appears well in excess of the projected level of resources.

However, all these evaluations of the feasibility of the plan depend upon the accuracy of the projections of future income, including not only the plan budget itself, but the regular budget of the Ministry of education. These projections, in turn, depend on forecasts of the over-all rate of growth of national income and government expenditure. If the performance of the economy as a whole falls short of anticipated targets, the feasibility of the entire plan may be affected.

IV. Critical evaluation of the costing and feasibility testing of the plan

It should be emphasized that this exercise in costing and feasibility testing is based upon admittedly crude estimates of cost per pupil, and that the resulting estimates represent only rough approximations. But even such a crude method of estimating costs can provide the planner with some essential information and with a simple assessment of the feasibility of plan targets.

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There are, however, a number of weaknesses in the methodology which influence the accuracy of the cost estimates. For example, the analysis of costs presented in the previous case study showed that there were often substantial differences in costs between rural urban schools; in this case, to base the entire cost estimate of the educational expansion on national averages derived mainly from budget data rather than actual expenditure figures may produce misleading results.

Part I of that case study showed that the qualifications and seniority of teachers considerably affect teachers' salary costs, and thus total current expenditure, yet it was possible to make only rough allowances for future changes in the level of qualifications and seniority of teachers. A more accurate assessment of salary costs would demand an analysis of the actual distribution of the teaching force by age and qualifications, combined with realistic estimates of future changes, based on such data as average retirement rates of teachers.

Many of the cost estimates are based on the assumption that ratios between different types of expenditure, for example between teacher and non-teacher costs, would remain constant. An interesting exercise would have been to test the sensitivity of the estimates of costs at different levels to future changes in these ratios.

A similar criticism can be levelled at the projections of future resources. These are singly-valued estimates, based on the assumption of an 8 per cent annual rate of growth of GNP. The drought of 1967, which caused a 10 to 20 per cent reduction in the output of rice, together with a fall in the price of several of Thailand's main exports, meant that the rate of growth in that year was only 7 per cent, and a 6 per cent growth rate is now forecast for 1968. This will clearly affect the supply of resources both through the regular budget of the Ministry of education—which in this exercise is calculated simply as a percentage of GNP—and the plan budget itself, 83 per cent of which is to be financed by national contributions. On the other hand, the estimates of resources were based on provisional figures for GNP in 1966-67, and subsequent revisions revealed that GNP was higher than the provisional estimates. The combined effect of these two factors meant that although the National Economic Development Board made some revisions of the plan in 1968 to take account of changing economic conditions, these did not seriously affect the allocation for education.¹ Nevertheless, it would have been useful to prepare alternative projections of available resources, in order to test the feasibility of the plan in the event of lower growth rates of GNP.

The methodology of costing the educational budget suffers principally from the shortage of data on actual expenditure patterns. The estimates of capital costs, for example, are based on very inadequate data on expenditure on school buildings at some levels of education, for example secondary schooling, although more information is available on primary school and vocational school costs.

A last criticism of this method of setting targets, preparing estimates of their cost, and evaluating their feasibility, is that cost analysis plays a relatively passive role. The targets were set on the basis of social demand and manpower consider-

1. See appendix, table 10.

ations, but no attempt was made to examine the distribution of resources and the relative priority attached to different levels in the light of costs. Cost data are used to provide an over-all estimate of the financial consequences of implementing the targets, but do not play an integral part in the setting-up of the targets and the allocation of projects between different levels. Thus it is difficult to judge the scale of priorities in the educational plan, since they are not based on explicit consideration of the relative costs and benefits to be expected from attaining enrolment targets in different levels of education. For example, the plan proposes a 30 per cent increase of enrolment in universities, which will entail an allocation of almost 40 per cent of the total development budget for education; yet the current cost per student at this level is ten times as high as that in secondary education, so that a ratio of 10:1 in the expected benefits from the two levels is needed to justify this rapid expansion of the university level. Although it is very difficult to measure the economic benefits of education, and data do not yet exist which would allow a conventional cost-benefit analysis of education in Thailand, it would have been valuable to take explicit account of cost differences when setting targets for the plan, and to attempt an assessment of the expected benefits from alternative allocations of resources in order to justify the priorities chosen.

At the same time, more attention could be paid to ways of reducing the differences in cost in order to achieve the same targets with lower expenditure. At the university level the average student/teacher ratio is 8:1, and there is under-utilization of buildings. Increasing the ratio to 10:1 and a more intensive use of building space could allow an increase in enrolment without very much increase in expenditure. But the plan does not propose such steps. On the other hand, if information on relative costs were used to justify the search for greater efficiency or to re-assess relative priorities between levels, cost data could play a more integrated role in the process of educational planning.

V. Conclusions

The general conclusion of the feasibility testing exercise in Thailand is that while resources will probably be sufficient to finance capital investment, they are not likely to be sufficient for financing current expenditure. This emphasizes the need to analyse very carefully the relationship between capital investment and subsequent expenditure. In the present case, the shortage of resources for current expenditure may lead to a revision of plan targets and to a change in the relative priority attached to different types of education in order to make the plan financially feasible, because at the time the plan was first prepared the full financial consequences of the capital investment were not foreseen.

An important conclusion of this case study is that it is not financially feasible

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to meet the targets for graduates set in the plan, although it is feasible to implement the enrolment targets. This means that the targets set for graduates were not consistent with the enrolment targets, and that the cost of attaining them, taking into account average rates of wastage and repetition, would exceed available resources. This emphasizes the need for consistency between different targets in an educational plan, by taking account of such factors as wastage, and also the need to reduce wastage without correspondingly increasing the cost per pupil.

These conclusions apply to any country where educational planning is carried out in terms of enrolment targets. In many developing countries there are high rates of wastage which mean, as in Thailand, that the cost of producing the number of qualified school leavers or graduates considered necessary to meet requirements exceeds the available resources, although the enrolment targets set in the plan appear at first sight to be feasible. The conclusion of this case study, that cost analysis can play a more active role in formulating an educational plan than has so far been the case in Thailand, is also applicable to many other countries. If cost data are used to justify the search for more efficient educational methods, more efficient utilization of resources, and a better balance between different levels and types of education, rather than simply to provide a general estimate of the financial consequences of a decision, cost analysis can contribute much more fully to the actual process of decision-making in educational planning.

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Appendix

TABLE 1. Analysis of the increase in recurring budget outlay per pupil 1959-64 (baht)

	Total recurring cost	Personnel	Adminis- tration ¹	Materials and equipment	Scholar- ships	Social costs
<i>Primary education</i>						
Expenditure per student 1959	236	211	—	9	16	—
Expenditure per student 1964	261	240	2	17	2	—
Increase 1959-64 (2-1)	25	29	(2)	8	- 14	—
Real expenditure 1964 (index 108)	242	222	2	16	2	—
Real increase 1959-64 (4-1)	6	11	(2)	7	- 14	—
<i>Secondary general education</i>						
Expenditure per student 1959	897	691	—	89	117	—
Expenditure per student 1964	1 005	874	52	58	21	—
Increase 1959-64 (2-1)	108	183	(52)	- 31	- 96	—
Real expenditure 1964 (index 108)	931	809	48	54	19	—
Real increase 1959-64 (4-1)	34	118	(48)	- 35	- 98	—
<i>Technical and vocational education</i>						
Expenditure per student 1959	1 121	717	—	280	124	—
Expenditure per student 1964	2 367	1 685	102	492	88	—
Increase 1959-64 (2-1)	1 264	968	(102)	212	- 36	—
Real expenditure 1964 (index 108)	2 192	1 560	94	456	81	—
Real increase 1959-64 (4-1)	1 071	843	(94)	176	- 43	—
<i>Teacher training</i>						
Expenditure per student 1959	2 670	1 410	—	480	780	—
Expenditure per student 1964	3 138	2 206	358	433	141	—
Increase 1959-64 (2-1)	468	796	(358)	- 47	- 639	—
Real expenditure 1964 (index 108)	2 906	2 043	331	401	131	—
Real increase 1959-64 (4-1)	236	633	(331)	- 79	- 649	—
<i>Higher education</i>						
Expenditure per student 1959	5 599	3 690	—	1 641	39	229
Expenditure per student 1964	9 423	5 437	961	2 676	170	170
Increase 1959-64 (2-1)	3 824	1 747	(961)	1 035	140	- 59
Real expenditure 1964 (index 108)	8 725	5 034	890	2 478	166	157
Real increase 1959-64 (4-1)	3 126	1 344	(890)	837	127	- 72
<i>All levels</i>						
Expenditure per student 1959	325	253	21	25	26	—
Expenditure per student 1964	383	314	28	36	5	—
Increase 1959-64 (2-1)	58	61	(7)	11	- 21	—
Real expenditure 1964 (index 108)	355	291	26	33	5	—
Real increase 1959-64 (4-1)	30	38	(5)	8	- 21	—

NOTE The index (108) was computed from over-all price and wage indices on the basis of 1959 = 100.
1. Since no data on this item were available for 1959 the figure in brackets are for computation purposes only.

TABLE 2. Teachers by type of education and qualification, 1956, 1959, 1964

	1956				1959				1964			
	Primary	Secondary	Vocational	Teachers training	Primary	Secondary	Vocational	Teachers training	Primary	Secondary	Vocational	Teachers training
Teaching certificate												
Degree	13	259	155	181	92	728	473	801	926	2 223	1 050	1 222
Percentage	(0.1)	(5.4)	(6.0)	(27.1)	(0.9)	(9.1)	(10.8)	(54.2)	(0.9)	(24.1)	(20.0)	(73.6)
Diploma	5	55	44	31	36	119	50	43	9 496	5 278	1 632	258
Percentage	(0)	(1.1)	(1.7)	(4.6)	(0.1)	(1.5)	(1.1)	(2.9)	(9.4)	(57.2)	(31)	(15.6)
Certificate (primary and secondary schools)												
Percentage	3 247	3 958	909	388	11 746	6 593	1 499	535	35 719	1 262	873	168
Lower certificate (pre-primary and vocational schools)												
Percentage	24 519	279	190	7	31 046	222	90	7	35 869	403	1 450	100
No teaching certificate												
Percentage	52 512	269	1 297	61	48 725	321	2 288	91	22 332	135	256	14
Percentage	(65.4)	(6.6)	(50.0)	(9.1)	(53.2)	(4.0)	(52.0)	(6.2)	(22.0)	(0.6)	(4.8)	(0.7)
TOTAL	80 296	4 820	2 595	668	91 645	7 983	4 400	1 477	104 342	9 231	5 261	1 762
PERCENTAGE	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)

TABLE 3. Qualifications, salary scale and expected official salary as compared to real salaries received in 1959 and 1967

	% qualifications		Official scale (baht)		Composition by qualification (baht)					Actual budget salary (baht)	
	1959	1964	1959	1964	1959	1964	Change	1959	1964	1959-64	1959-64
	1	2	3	4	5	6	7	8	9	10	10
<i>Primary education</i>											
Degree	0.0	0.9	11 300	13 600	102	122	20				
Diploma	0.1	9.4	7 500	9 000	8	846	838				
Certificate	46.7	67.7	6 000	7 200	2 802	4 874	2 070				
No certificate	53.2	22.0	4 500	5 400	2 394	1 188	- 1 206				
Total	100.0	100.0			5 306	7 030	1 722 (32.5)	7 398	9 073	1 675 (22.6)	
Percentage increase											
<i>Secondary education</i>											
Degree	9.1	24.1	11 300	13 600	1 028	3 278	2 250				
Diploma	1.5	57.2	7 500	9 000	113	5 148	5 035				
Certificate	85.4	18.1	6 000	7 200	5 124	1 303	- 3 821				
No certificate	4.0	0.6	4 500	5 400	180	32	- 148				
Total	100.0	100.0			6 445	9 761	3 316 (51.5)	12 059	14 742	2 683 (22.2)	
Percentage increase											
<i>Teacher training</i>											
Degree	54.2	73.6	11 300	13 600	6 125	10 010	3 885				
Diploma	2.9	15.6	7 500	9 000	218	1 404	1 186				
Certificate	36.7	10.1	6 000	7 200	2 202	727	- 1 475				
No certificate	6.2	0.7	4 500	5 400	279	38	- 241				
Total	100.0	100.0			8 824	12 179	3 355 (38.0)	17 603	29 061	11 458 (65.1)	
Percentage increase											
<i>Vocational education</i>											
Degree	10.8	20.0	11 300	13 600	1 220	2 720	1 500				
Diploma	1.1	31.0	7 500	9 000	825	2 790	1 965				
Certificate	36.1	44.2	6 000	7 200	2 166	3 182	1 016				
No certificate	52.0	4.8	4 500	5 400	2 340	259	- 2 081				
Total	100.0	100.0			6 551	8 951	2 400 (36.6)	10 818	14 113	3 295 (30.5)	
Percentage increase											

TABLE 4: Teacher requirements by educational level during the second plan period

Educational level	Student increase between 1967-1971	Teacher/student ratio deemed appropriate	New teachers required
Kindergarten	37 800	1 : 30	1 260
Primary			
Grade 1-4	522 000	1 : 35	14 914
Grade 5-7	214 000	1 : 25	8 560
Secondary general			
Grade 8-12	228 200	1 : 25	9 208
Secondary vocational			
Grade 8-13	20 400	1 : 15	1 360
Teacher training	11 970	1 : 10	1 190
Technical	10 630	1 : 10	1 063
University	10 300	1 : 10	1 030
TOTAL	1 055 300	—	38 585
Additional number of teachers required for replacement of the present number due to death, retirement or other reasons,			11 000
GRAND TOTAL			49 585

TABLE 5. Estimated number of graduates from teacher-training colleges and schools, 1967-71

Year	Number of graduates with :		
	Certificate of education ¹	Higher certificate of education ²	Bachelor's degree in education ³ and above
1967	5 310	1 755	845
1968	5 850	1 985	1 098
1969	6 390	2 165	1 455
1970	6 930	2 345	1 700
1971	7 470	2 525	1 933
TOTAL	31 950	10 775 ⁴	7 031

1. Grade 10 followed by 2 years of training.

2. Grade 10 followed by 4 years of training.

3. Grade 12 followed by 4 years training or Grade 10 followed by 6 years of training.

4. Of which 1,325 with a vocational certificate.

TABLE 6. Number of students likely to graduate from vocational and technical schools during the plan period

Level of education	1967	1968	1969	1970	1971	Total
Grade 13 (vocational)	4 495	4 495	5 110	6 050	6 210	26 360
Grade 13 (technical)	545	572	698	710	775	3 300
Grade 13 (non-technical)	6 865	7 080	7 440	7 560	7 560	36 506
Grade 15 (technical)	1 059	1 383	1 570	1 639	1 688	7 339
Grade 15 (non-technical)	180	300	360	420	480	1 740
TOTAL	13 144	13 830	15 178	16 379	16 713	75 245

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TABLE 7. Second plan targets for university education by faculty

	Increase in enrolment 1966-71	Total number of graduates during the plan period
<i>Chulalongkorn University</i>		
Faculty of commerce and accountancy	780	1 490
Faculty of education	680	1 750
Faculty of political science	1 090	1 135
Faculty of science	450	1 250
Faculty of engineering	510	1 400
Faculty of architecture	140	390
Faculty of arts	700	830
Faculty of graduate studies	620	830
Department of mass communication	190	210
<i>SEATO graduate school of engineering¹</i>		
All departments	200	750
<i>Kasetsart University</i>		
Faculty of agriculture	970	1 100
Faculty of economics and business admin.	370	436
Faculty of forestry ²	480	440
Faculty of fisheries	270	150
Faculty of veterinary science	112	150
Faculty of science and arts ³	600	50
Faculty of engineering ³	80	—
Faculty of graduate studies	300	—
<i>Thammasat university</i>		
Faculty of political science	600	600
Faculty of economics	1 250	1 250
Faculty of law	800	4 200
Faculty of social administration	340	1 160
Faculty of commerce and accountancy	239	2 090
Faculty of liberal arts	125	600
<i>Silpakorn university (Fine arts)</i>		
Faculty of painting and sculpture ⁴	40	90
Faculty of decorative arts	90	135
Faculty of Thai architecture	50	160
Faculty of archaeology	10	—
Faculty of arts ³	580	—
Faculty of science ³	250	—
Faculty of music ^{3,4}	30	—
<i>University of Chiang Mai</i>		
Faculty of science	—	550
Faculty of humanities	609	531
Faculty of social sciences	627	464
Faculty of agriculture	570	155
Faculty of education ³	75	475
Faculty of engineering ³	90	—
<i>University of the northeast, Khon Kaen</i>		
Faculty of science and arts ³	180	—
Faculty of engineering	470	310
Faculty of agriculture	445	200
Faculty of education ³	180	—

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TABLE 7. Continued

	Increase in enrolment 1966-71	Total number of graduates during the plan period
<i>The national institute of development administration</i>		
Faculty of public administration	100	250
Faculty of business administration ³	350	150
Faculty of economic development ³	120	—
Faculty of applied statistics	240	360
<i>University of the South</i>		
Faculty of engineering ³	250	30
Faculty of arts and science ³	280	—
<i>The University of medical sciences</i>		
Faculty of medicine—Siriraj hospital	...	650
Faculty of medicine—Chulalongkorn hospital	68	400
Faculty of dentistry	100	300
Faculty of pharmacy ²	147	650
Faculty of public health ²	335	1 325
Faculty of medical technology ⁴	140	500
Faculty of tropical medicine ³	12	60
Phyathai faculty of medicine ³	250	30
Faculty of graduate studies	25	—
Faculty of medical sciences	160	2 545

1. To be renamed the Asian Institute of Technology.

2. Undergraduate and graduates.

3. New faculty.

4. Diploma level studies only.

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TABLE 8. Second plan development projects financed by budget appropriations—education sector (millions of baht)

	1967	1968	1969	1970	1971	Total
<i>A. Ministry of Education</i>	<i>624.83</i>	<i>713.30</i>	<i>779.50</i>	<i>869.50</i>	<i>960.30</i>	<i>3 947.43</i>
<i>Department of Elementary Education</i>	<i>315.47</i>	<i>355.50</i>	<i>388.50</i>	<i>427.50</i>	<i>464.00</i>	<i>1 950.97</i>
Expansion and improvement of kindergarten	4.00	4.00	4.00	4.00	4.00	20.00
Compulsory education ¹ (grade 1-4)	210.00	240.00	266.00	296.00	321.00	1 333.00
Upper primary education (grade 5-7)	95.00	104.00	109.00	114.00	124.00	546.00
Educational supervision projects	2.50	2.50	2.50	2.50	3.00	13.00
Expansion and improvement of welfare schools	3.30	3.00	3.00	3.00	2.00	14.30
Expansion of adult education project	.67	2.00	4.00	8.00	10.00	24.67
<i>Department of Secondary Education</i>	<i>112.20</i>	<i>119.80</i>	<i>139.00</i>	<i>163.00</i>	<i>207.00</i>	<i>741.00</i>
Secondary and pre-university education	81.20	93.80	106.00	124.00	162.00	567.00
Comprehensive schools	31.00	26.00	33.00	39.00	45.00	174.00
<i>Department of Vocational Education</i>	<i>142.43</i>	<i>162.00</i>	<i>162.00</i>	<i>185.00</i>	<i>192.00</i>	<i>843.43</i>
Expansion and improvement of trade schools	16.00	19.00	21.00	49.00	62.00	167.00
Expansion and improvement of commercial and industrial schools	13.00	14.00	15.00	19.00	20.00	81.00
Expansion and improvement of technical institutes	22.00	39.00	55.00	65.00	70.00	251.00
Expansion and improvement of agricultural schools (outside the scope of the IBRD Loan Project)	8.00	8.00	8.00	8.00	8.00	40.00
IBRD Loan Project	83.00	69.00	44.00	25.00	19.00	240.00
Establishment of Chao Khun Taharn vocational teachers' college	—	10.00	15.00	15.00	10.00	50.00
Expansion and improvement of non-grade vocational schools and of mobile vocational training units	.43	3.00	4.00	4.00	3.00	14.43
<i>Department of Teacher Training</i>	<i>52.73</i>	<i>74.00</i>	<i>88.00</i>	<i>92.00</i>	<i>94.00</i>	<i>401.03</i>
Expansion and improvement of teacher training at certificate levels	42.00	50.00	55.00	58.00	62.00	267.00
Expansion and improvement of teacher training at degree levels	8.00	16.00	22.00	23.00	25.00	94.00

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TABLE 8. Continued

	1967	1968	1969	1970	1971	Total
Teacher training for comprehensive schools	2.00	4.00	5.00	5.00	4.00	20.00
National institute for educational reform and adaptation	.73	2.00	3.00	3.00	1.30	10.03
Text bureau	—	2.00	3.00	3.00	2.00	10.00
Office of the Under-Secretary	2.00	2.00	2.00	2.00	3.00	11.00
Expansion and improvement of educational radio and television projects	2.00	2.00	2.00	2.00	3.00	11.00
B. Universities	269.00	367.00	324.00	300.00	293.00	1 553.00
Expansion and improvement of Chulalongkorn university	29.00	35.00	36.00	42.00	43.00	185.00
Expansion and improvement of Kasetsart university	23.00	37.00	43.00	45.00	52.00	200.00
Expansion and improvement of Thammasat university	9.00	25.00	20.00	8.00	7.00	69.00
Expansion and improvement of the University of medical sciences	80.00	83.00	76.00	66.00	65.00	370.00
Expansion and improvement of Silpakorn university	9.00	15.00	17.00	20.00	15.00	76.00
Expansion and improvement of Chiang Mai university	52.00	95.00	52.00	54.00	43.00	296.00
Expansion and improvement of Khon Kaen university	28.00	30.00	45.00	35.00	33.00	171.00
Establishment of the national institute of development administration	15.00	27.00	15.00	5.00	5.00	67.00
Establishment of the university of the South	24.00	20.00	20.00	25.00	30.00	119.00
GRAND TOTAL	893.83	1 080.30	1 103.50	1 169.50	1 253.30	5 500.43
1. Part of the appropriation will be allocated to the Ministry of interior.						

TABLE 9. Educational development budget—1968 (million baht)

	1968			Total
	Budget	Foreign loan	Foreign aid	
<i>A. Ministry of Education</i>	714.26	30.20	71.86	816.32
<i>Primary education department</i>	326.74	—	1.91	328.65
Expansion and development of kindergarten schools	6.79	—	—	6.79
Operation of compulsory education (grade 1-4)	309.03	—	1.31	310.34
Operation of upper primary education (grade 5-7)				
Demonstration of educational techniques	3.05	—	—	3.05
Expansion and development of subsidised schools	6.35	—	—	6.35
Extension of adult education	1.52	—	0.60	2.12
<i>Secondary education department</i>	120.03	17.40	9.68	147.11
Operation of secondary and pre-university education	70.76	—	7.80	78.56
Operation of comprehensive education	49.27	17.40	1.88	68.55
<i>Department of vocational education</i>	186.40	12.80	38.16	237.36
Expansion and development of technical schools	22.75	—	0.34	23.09
Expansion and development of commercial and industrial schools	13.57	—	3.00	16.57
Expansion and development of high vocational studies	30.37	—	6.47	36.84
Expansion and development of agricultural schools (outside loan projects)	7.70	—	—	7.70
Project for the development of business studies	105.66	12.80	8.25	126.71
Expansion and development of technical schools and mobile vocational-training units	2.83	—	17.60	20.43
Project for agricultural engineering	3.52	—	2.50	6.02
<i>Teacher's training department</i>	4.88	—	0.51	75.39
Expansion and development of teachers production at diploma levels	58.32	—	0.48	58.80
Expansion and development of teachers production at degree levels	16.18	—	0.02	16.20
Production of teachers for comprehensive secondary schools (included in item 1)	—	—	—	—
Institute for educational research	0.13	—	0.01	0.14
Experimental institutes	0.25	—	—	0.25

TABLE 9. Continued

	1968			
	Budget	Foreign loan	Foreign aid	Total
<i>Office of the under-secretary</i>	6.21	—	21.60	27.81
Expansion and development of educational radio and television	0.59	—	3.40	3.99
Project for general educational development	5.40	—	—	5.40
Project for provincial educational development	0.22	—	18.20	18.42
<i>B. Universities</i>				
<i>Total development budget</i>	468.72	30.00	32.16	530.88
Chulalongkorn university	63.27	10.00	3.16	76.43
Kasetsart university	56.99	20.00	—	76.99
Thammasat university	25.67	—	1.80	27.47
Medical science university	190.59	—	4.00	194.59
Silpakorn university	9.36	—	—	9.36
Chiang Mai university	67.02	—	18.20	85.22
Khon Kaen university	19.69	—	5.00	24.69
Public administration institute	11.67	—	—	11.67
The university of the South	24.46	—	—	24.46
TOTAL EDUCATIONAL DEVELOPMENT BUDGET	1 182.98	60.20	104.02	1 347.20

TABLE 10. Second plan development projects financed by foreign loans—education sector (millions of baht)

Project	1967	1968	1969	1970	1971	Total
Comprehensive schools ¹	4.00	4.00	4.00	4.00	4.00	20.00
Vocational education ¹	20.00	25.00	25.00	25.00	25.00	120.00
Faculty of engineering, Chulalongkorn university	—	10.00	10.00	10.00	17.00	47.00
Kasetsart university	—	20.00	25.00	25.00	30.00	100.00
Vocational education ²	12.00	78.00	45.00	25.00	20.00	180.00
Comprehensive schools ²	—	20.00	25.00	30.00	35.00	110.00
TOTAL	36.00	157.00	134.00	119.00	131.00	577.00

1. Continued from the first plan.

2. Includes foreign exchange from the Bank of Thailand.

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TABLE 11. Summary of second plan development expenditure by financing source-education sector (millions of baht)

Sources of finance	1967	1968	1969	1970	1971	Total
National budget	893.83	1 080.30	1 103.50	1 169.50	1 253.30	5 500.43
Foreign loans ¹	36.00	157.00	134.00	119.00	131.00	577.00
Foreign grants	90.00	100.00	110.00	115.00	120.00	535.00
GRAND TOTAL	1 019.83	1 337.30	1 347.50	1 403.50	1 504.30	6 612.43

1. Includes foreign exchange of 290 million baht from the Bank of Thailand.

TABLE 12. Second plan development projects financed by foreign grants education sector (millions of baht)

Project	1967	1968	1969	1970	1971	Total
<i>Continuing projects</i>	<i>67.80</i>	<i>60.20</i>	<i>18.10</i>	<i>5.50</i>	<i>3.00</i>	<i>154.60</i>
1. <i>United States</i>	<i>49.60</i>	<i>45.90</i>	<i>12.20</i>	<i>5.50</i>	<i>3.00</i>	<i>116.20</i>
Vocational education	5.50	8.30	4.20	4.20	2.10	24.30
Rural education	19.10	17.60	6.80	—	—	43.50
Faculty of medicine, Chiang Mai university	18.20	18.20	—	—	—	36.40
Graduate school of engineering	5.50	—	—	—	—	5.50
Faculty of commerce	1.30	1.80	1.20	1.30	.90	6.50
2. <i>United Nations Special Fund</i>	<i>.60</i>	<i>—</i>	<i>—</i>	<i>—</i>	<i>—</i>	<i>.60</i>
Thon Buri technical institute	.60	—	—	—	—	.60
3. <i>Colombo Plan</i>						
Khon Kaen University Engineering faculty, Chulalongkorn university	6.30	6.30	—	—	—	12.60
Chulalongkorn university	4.00	4.00	4.00	—	—	12.00
4. <i>Other sources</i>	<i>7.30</i>	<i>4.00</i>	<i>1.90</i>	<i>—</i>	<i>—</i>	<i>13.20</i>
Thai-German technical institute	2.00	.70	.70	—	—	3.40
Khon Kaen technical school	3.20	2.30	.50	—	—	6.00
Agricultural engineering centre, Kasetsart university	1.30	1.00	.70	—	—	3.00
Engineering laboratory, Chulalongkorn university	.80	—	—	—	—	.80
<i>New or expanded projects (details not available)</i>	<i>22.20</i>	<i>39.80</i>	<i>91.90</i>	<i>109.50</i>	<i>117.00</i>	<i>380.40</i>
TOTAL	90.00	100.00	110.00	115.00	120.00	535.00

Asia

9

.Cost analysis in an Asian model
of educational development

prepared by J. Auerhan and E.S. Solomon

This study was prepared by Dr. J. Auerhan and Dr. E.S. Solomon, who are members of the Unesco Secretariat. They are the principal authors of the Unesco publication, *An Asian model of educational development (perspectives for 1965-80)* and prepared this present case study at the request of the IIEP. The views expressed in this document are those of the authors and not necessarily those of Unesco.

Introduction

The purpose of this case study is to describe and evaluate the experience of the cost analyses undertaken within the framework of the 'Unesco Asian model' of educational development.

The Ministers of education of Asian Member States of Unesco met in Tokyo in April 1962 and, after reviewing the progress made in the implementation of the Karachi Plan (for free and compulsory education of a minimum of seven years' duration), decided that the plan should be extended to cover all levels of education. The meeting requested Unesco, in co-operation with the Economic Commission for Asia and the Far East (ECAFE), to aid Member States in the task of 'establishing long-term educational perspective plans and in putting together these national plans into a draft Asian model' which was to be examined at the next meeting in December 1965.

In response to this request, Unesco appointed five consultants from Member States in Asia who, with the technical aid of the Secretariat, both from Headquarters and from the Regional Office for Education in Asia (Bangkok), and ECAFE, prepared a document *Perspectives of educational development in Asia: a draft Asian model*, which was considered and examined by the Conference of Ministers of education and Ministers responsible for economic planning of Member States of Unesco in Asia, held in Bangkok in November 1965. The Conference recommended that the document be published after incorporation of the revisions, amendments and alterations suggested by the Conference. The present case study is based upon the revised version of the Asian model, prepared by the Unesco Secretariat.¹

Asian countries have, on the one hand, many problems in common arising out of their needs and aspirations for development and, on the other hand, they represent a fairly wide range of levels of educational and general development. For the purposes of projections, it was felt appropriate to group the countries into three groups, according to the time when they are likely to implement the recommendations of the Karachi Plan. They are: group A: those which are likely to achieve it *after* 1980; group B: those which are likely to achieve it *around* 1980; group C: those which are likely to achieve it *before* 1980.

Group A: Afghanistan, Laos, Nepal

Group B: Burma, Cambodia, India, Indonesia, Iran, Mongolia, Pakistan, Rep. of Viet-Nam

Group C: Ceylon, Rep. of China, Rep. of Korea, Malaysia, Philippines, Singapore, Thailand.

Table 1 sets out, for the eighteen countries concerned, some of the indicators on which the projections in the model were based.

1. *An Asian model of educational development (perspectives for 1965-80)*, Unesco, Paris, 1966. The reader should refer to this publication for all supplementary information.

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TABLE 1. Selected demographic, educational and economic indicators for countries by groups

Group	Country	Total population 1965 (in thousands)	Population growth 1950-60 (% per annum)	Population under 15 years (1960) (per-centage)	Primary enrolment ratio, 1964 (per-centage)	Adult illite-rates as percentage of population aged 15 +	Average annual rate of GNP 1951-64 (per-centage)	GNP per capita 1963 (US \$)	Share of agriculture in GNP 1961 (per-centage)
A	Afghanistan	13 416	1.8	...	13	94	...	61	...
	Laos	2 626	3.2	...	31	72	...	68	...
	Nepal	9 953	1.4	...	20	91	...	...	...
B	Burma	24 752	1.9	41.3	52	40	4.8	76	43
	Cambodia	6 512	3.2	44.7	58	...	5.8	68	41
	India	486 985	1.9	41.1	64	73	3.9	73	46
	Indonesia	109 189	2.1	42.1	55	...	3.3	73	36
	Iran	23 261	2.2	42.2	51	84	...	153	27
	Mongolia	1 075	1.9	...	74	...	...	...	...
	Pakistan	113 356	2.1	44.5	37	81	3.5	74	56
	Viet-Nam, Rep. of	15 600	3.4	...	56	84	...	78	30
C	Ceylon	12 050	2.3	40.7	90	27	3.1	146	46
	China, Rep. of	12 249	3.4	45.1	98	41	8.1	139	31
	Korea, Rep. of	28 810	1.9	43.3	91	30	4.9	130	42
	Malaysia	11 417	2.9	43.8	82 ¹	47	4.8 ²	235	44 ²
	Philippines	32 357	3.1	45.7	98	28	5.4	135	34
	Singapore	...	4.8	42.8	97	...	...	336	...
	Thailand	31 972	3.1	43.2	75	33	6.1	116	39

NOTES 1. Excluding Singapore.
2. Including Singapore.

SOURCE *An Asian model of educational development*, op. cit., pp. 11, 12, 13, 15, 16, 39, 114, 117.

Since the 1950's, the educational systems of the countries in the Asian region have been expanding rapidly and enrolments have increased at all three levels of education. The enrolment data organized on a common educational structure (7 + 5 years for the primary and secondary levels of education) is shown in tables 2 and 3. It will be noted that while enrolment has expanded at all three levels of education, the rate of increase is higher at the secondary and higher levels. There is, in the region as a whole, the perceptible beginning of a shift in the educational efforts towards secondary and higher education.

The gap between the developing countries of Asia and the developed countries of other regions is more significant at the second and higher levels of education. In developed countries the enrolments, as percentages of total population, are two to four times higher than in the Asian region at the secondary level, and three to nine times higher at the higher level.

The structure of school systems differs from country to country in Asia and, in some instances, even from one part to another within a country (e.g. India). To

TABLE 2. Total enrolment, percentage of total enrolment and enrolment ratio by level of education, 1955, 1960 and 1964¹

Year	Item	Primary	Secondary	Higher	Total
1955 ²	total enrolment (millions)	58.2	6.4	0.8	65.4
	percentage of total enrolment	89.0	9.8	1.2	100
	enrolment ratio	46	9	1.6	27
1960	total enrolment (millions)	78.6	10.0	1.3	89.9
	percentage of total enrolment	87.5	11.1	1.4	100
	enrolment ratio	53	12	2.3	31
1964	total enrolment (millions)	103.8	14.4	1.9	120.1
	percentage of total enrolment	86.4	12.0	1.6	100
	enrolment ratio	61	15	3.0	36

1. Enrolment ratio is enrolment as a percentage of corresponding age-groups 6-12, 13-17 and 18-21 respectively.

2. 1955 figures were estimated.

SOURCE *An Asian model of educational development*, op. cit., p. 19.

TABLE 3. Increase of total enrolment by level of education, 1955-64

Level	Total increase (1955 = 100)	Annual rate of increase (percentage)
Primary education	178	6.7
Secondary education	225	9.4
Higher education	239	10.1
MEAN	184	6.9

SOURCE *An Asian model of educational development*, op. cit. p. 19.

present an analysis of the future educational developments in a region as a whole, therefore, it is essential to adopt a measure into which the flow of enrolments in differing school systems can be fitted to provide a common and comparable basis for interpreting the significance of these figures and their movement. This has been done in the form of a hypothetical school structure, which assumes, in accordance with the recommendations of the Karachi Plan, seven years of primary education, followed by five years of secondary education, divided into two parts, i.e. grades VIII-X and grades XI and XII. The higher level of education, in this model, follows on after twelve years of schooling.

Figure 1 sets out the structure of the school system that has been assumed for the purposes outlined above. The basic unit of calculation is the individual grade or year of study and the data can be regrouped into any system of education, existing in any particular country, although in that case the points of transition will be different.

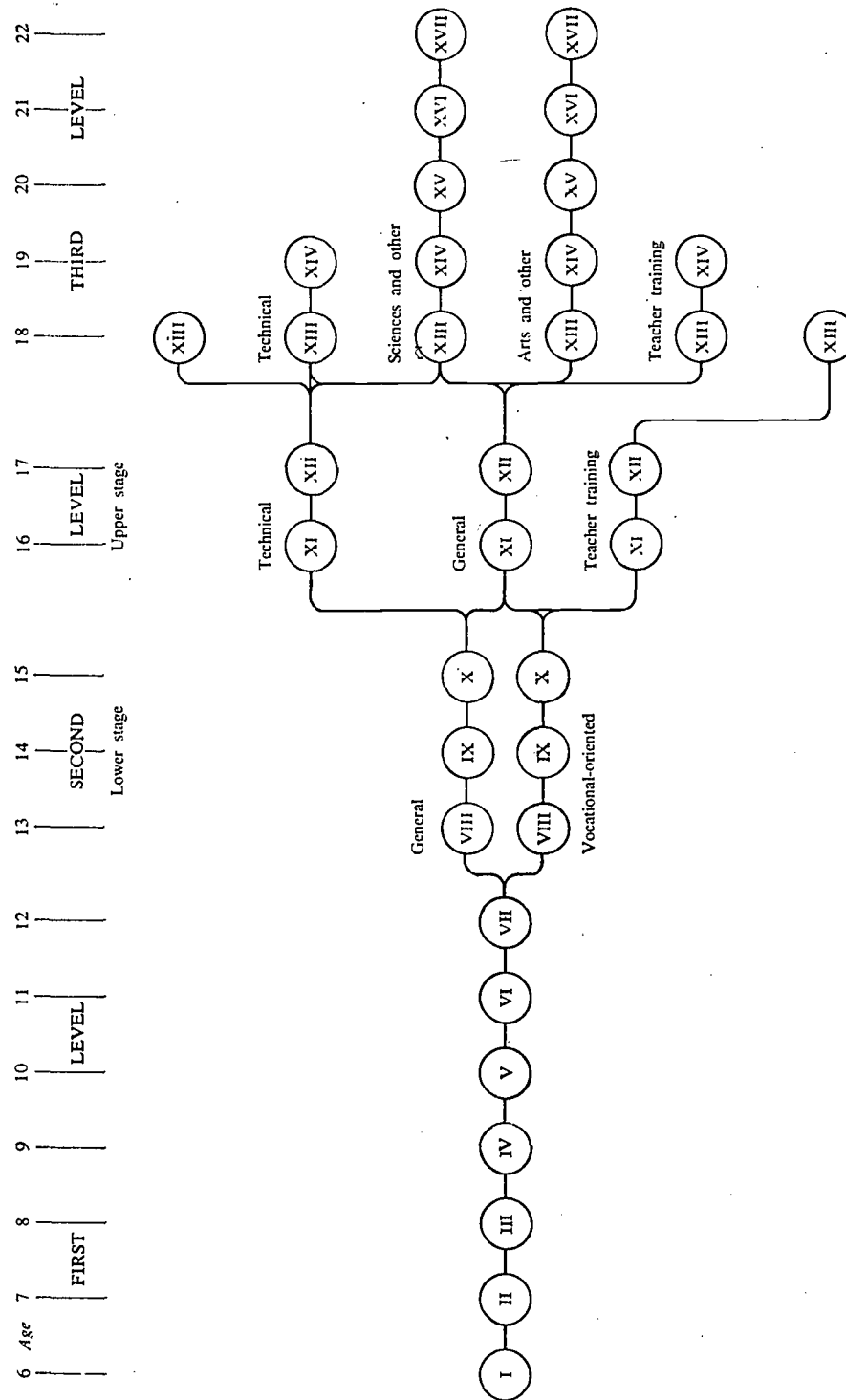


FIGURE 1. Hypothetical school structure.

1. The assumptions and projections of the model

Educational goals for the three groups of countries and for the region as a whole were determined chiefly on the basis of social, political and cultural demand, as reflected both in recommendations of previous conferences of Ministers of education of Asian Member States (Karachi and Tokyo) and in national documents.

The main aims are:

1. Free and compulsory education of a minimum of seven years' duration;
2. The need for balanced development of education at all levels;
3. The need for diversification of education by enlarging and strengthening vocational and technical education at the secondary and higher levels;
4. Expansion and improvement of science education at all levels;
5. Development of education should reflect the principle of equality of educational opportunity and should, in particular, gradually eliminate the disparity between enrolments of boys and girls.

For the region as a whole, and for the majority of the countries in the region, long-term forecasts of manpower requirements and long-term plans for economic and social development, from which manpower requirements could be derived, were not available. Nevertheless, certain manpower considerations have been identified:

1. Most countries of the region were experiencing a considerable lack of personnel with technical skills, and all the evidence available indicated that future demand for technical skills at all levels would rapidly increase.
2. The ratio of middle-level technical manpower to high-level professional manpower was generally very low, thus retarding the full utilization of scarce resources such as high-level scientists and engineers.
3. The level of education and training of middle-level technical manpower (skilled workers, junior technicians and senior technicians) was generally considered inadequate and the necessity of gradually upgrading middle-level technical manpower by extending the period of their education was felt strongly within the region.
4. At the same time, some countries were experiencing a lack of employment opportunities for persons completing general secondary education and courses in arts and humanities at the higher level. As a general rule, there was a strong feeling in the countries of the region that employment opportunities for these categories of manpower will increase at a considerably slower rate than employment opportunities for manpower with scientific and technical education.
5. Finally, future requirements for teachers for all levels of education were determined on the basis of enrolment targets for each level of education and modified by assumptions concerning desirable qualification of teachers and desirable pupil/teacher ratios.

The preparation of internally consistent and realistic educational projections entails a great deal of calculation. This is necessarily time-consuming and, in view of the time-limits inherent in any planning activity, the educational planner often

finds himself in a situation where he cannot possibly investigate all the feasible alternatives and analyse their implications in order to arrive at a solution close to the optimum. To overcome these limitations an educational model was developed based on the general framework of the work done in preparation for the 1965 educational conference at Bangkok. This model, while systematizing in a rigorous and consistent way the methodology of educational projections and providing the possibility of using modern high-speed computers, introduced much more flexibility into the process of educational planning.

The model was not designed for determining educational targets, but rather for quantifying various hypotheses affecting future performance of the educational system and for analysing their direct and indirect implications in terms of school enrolment and educational output, number of teachers required, and recurrent and capital costs. By showing the quantitative implications of the assumptions used, the model also contributes to a better understanding of the complex inter-relationships within the educational system.

The model regards school education as an autonomous system through which a flow of people proceeds from grade to grade and from type to type. This flow into, through and out of the educational system is determined mainly by the size of the population eligible for entry, the proportion of those continuing through the system and their distribution among the various types of education within each level. The values of these factors are, in turn, determined by both educational and non-educational conditions. Some may be direct policy decisions for the future, such as the decision to enrol a given proportion of the population groups eligible for entry; others may be outside the control of the planner and policy-maker, such as population changes.

For example, the enrolment in the third year of a university science faculty in 1980 is the cumulative result of (a) the number of children who were born in 1960 and survived to age 6 (assuming this to be the school-entry age); (b) the proportion of 6-year-olds entering the first grade in 1966; (c) the proportion continuing through the primary school from grade to grade, which may be affected by a compulsory school attendance of a specific duration; (d) the proportion entering secondary education in 1973 (assuming primary education to be of seven years' duration) and the distribution of those enrolled among various types of education; (e) the proportion continuing through secondary level from grade to grade; (f) the proportion entering higher education in 1978 (assuming the secondary level to be of five years' duration) and the distribution of first-year enrolment among various types of higher education; (g) the proportion in the university science faculty continuing through higher education from year to year until 1980.

The actual size of the population being educated is also determined by such demographic factors as death-rates, migration, etc. Furthermore, the educational proportions are in themselves influenced by the availability of school facilities, the quality and quantity of teachers, teaching methods, financial constraints, etc.

The model, by describing systematically the inter-relationships within the educational system and by identifying factors influencing its behaviour, can

simulate the dynamics of future changes in any quantitatively defined conditions affecting the educational system. It is thus a flexible tool at the disposal of the planner, giving the practical possibility of exploring the quantitative implications of various alternative assumptions.

The model was designed to be sufficiently detailed for national planning, permitting adaptation to particular situations as might arise. When it was used to identify the perspectives of educational development in Asia for the period 1965 to 1980 it became apparent that some of the elements, while important for national planning, are not relevant for a regional operation.¹ Some other elements were not available owing to a lack of detailed statistical information covering all countries of the region. The methodology actually used for the Asian region was, therefore, adapted to suit the particular conditions prevailing.

II. The cost analysis

Within the framework of the Asian educational model cost analysis was used for the following main purposes:

1. To define the major cost items relevant for over-all educational planning and to identify their values for the three groups of countries within the region which might serve as a guide for national educational planning, in the absence of detailed national cost data.
2. To identify areas where the efficiency of the educational systems might be improved.
3. To provide a certain test of the economic feasibility of the envisaged educational objectives.

It should be noted that, for this particular purpose, the concept of costs was used as against the concept of expenditure. Whereas expenditure corresponds to what is actually being spent, costs reflect, for each item identified, the value of goods and services considered as 'normal'. For example, the services of a teacher have been valued at a standard rate estimated on the basis of the present salary structure and estimated future changes. If, however, volunteer teachers were used (which is not exceptional in some Asian countries, especially at the primary level of education), their value was included even though the actual expenditure would obviously be considerably lower. Capital costs and expenditure were treated in the same way.

The cost analysis has been consistently based on unit costs, i.e. on recurrent costs per pupil and on capital costs per additional pupil-place. Opportunity costs, representing the estimated loss of income from foregone employment opportunities or, in case of capital costs, from not devoting these resources to alternative investment projects, have *not* been taken into account.

1. See *An Asian model of educational development*, op. cit.

The detailed formulae of the model will now be given, followed by a section on the illustrative data used in and obtained by the model.

A. Technical features¹

In the model, designed for the use of national planners, the cost items have been identified and linked to enrolment targets as follows (separately, of course, for recurring and capital costs):

Formula 1

$$v_y^{(t,g)} = \widehat{va}_y^{(t,g)} + \widehat{vb}_y^{(t,g)} + \widehat{vc}_y^{(t,g)} + \widehat{vd}_y^{(t,g)} + \widehat{ve}_y^{(t,g)} + \widehat{vf}_y^{(t,g)} + \widehat{vg}_y^{(t,g)} + \widehat{vh}_y^{(t,g)} + \widehat{vi}_y^{(t,g)}$$

where: v = per-pupil recurrent cost;
 \widehat{va} = per-pupil teacher-salary cost;
 \widehat{vb} = per-pupil personnel cost, other than teacher-salary cost;
 \widehat{vc} = per-pupil cost of general administration;
 \widehat{vd} = per-pupil cost of maintenance and operation of educational establishments;
 \widehat{ve} = per-pupil cost of books;
 \widehat{vf} = per-pupil welfare cost (school meals, etc.);
 \widehat{vg} = per-pupil auxiliary cost (transportation, etc.);
 \widehat{vh} = per-pupil scholarship and stipend cost;
 \widehat{vi} = per-pupil cost of instructional materials, other than books;
 t = any type of education or course;
 g = grade;
 y = year.

The per-pupil costs for the items identified in formula 1 are, of course, type of education and grade specific. As such they are actually averages of the gross costs divided by the enrolment. Thus, for example, \widehat{va} is equal to the total teacher-salary costs for a *type* and corresponding grades, divided by the enrolment in that *type* (and corresponding grades), and so forth. For projections, however, this information is usually more readily available not per pupil, but per teacher. It may also be the case that information exists as to the per-pupil cost of some items but that not all pupils in that type of education (and corresponding grades) are covered by that item. For example, the cost of books per-pupil may be known for those pupils who receive books, but only a proportion of the pupils in that type of school may receive books. In these and similar cases it would be more

1. The reader who is not familiar with mathematical formulae should not be discouraged by this section and should not omit it in his reading. He might well avoid concentrating on the formulae but should read the explanation provided in order to understand the way the model works.

convenient to deal with some of the cost items individually in order to obtain the average per-pupil values for a specific type (and corresponding grades) needed for formula 1. For example:

Formula 2

$$\widehat{va}_y^{(t,g)} = \frac{F_y^{(t,g)}}{f_y^{(t,g)}}$$

where F = average teacher salary;

f = pupil-teacher ratio;

and

Formula 3

$$\widehat{ve}_y^{(t,g)} = \widehat{ve}_y^{(t,g)} \mu_y^{(t,g)}$$

where: \widehat{ve} = per-pupil cost of books for pupils receiving books;

μ = proportion of pupils receiving books.

The same approach as described in formula 3 can be used for some other cost items, like per-pupil welfare cost, per-pupil auxiliary cost, per-pupil scholarship and stipend cost, that is, where not all the pupils in the type (and corresponding grades) are expected to be covered by that item.

In cases where other cost items are important or where accounting systems lead to classification of items different from those shown in formula 1, the procedure described above can be modified accordingly. Total recurrent costs for a specific type of education are merely:

Formula 4

$$V_y^{(t,g)} = v_y^{(t,g)} E_y^{(t,g)}$$

where: V = total recurrent costs;

E = enrolment, full-time equivalent.

The calculation of recurrent costs (the same is true for capital costs) is thus done separately for each type of education. The total for the whole educational system is obviously the sum of recurrent costs for every relevant type. If some cost items are not obtainable separately for each type (which may be the case for central administration), they must be added to the relevant recurrent cost total.

Capital costs may be divided into three categories: capital costs for schools; for student residences; and for teacher residences. Each of these may be expressed in unit terms. Thus the cost in per-pupil-place terms for schools is:

Formula 5

$$\begin{aligned} u_y^{(t,g)} = & \widehat{ca}_y^{(t,g)} \widehat{qa}_y^{(t,g)} + \widehat{cb}_y^{(t,g)} \widehat{qb}_y^{(t,g)} + \widehat{cc}_y^{(t,g)} \widehat{qc}_y^{(t,g)} + \widehat{cd}_y^{(t,g)} \widehat{qd}_y^{(t,g)} + \\ & + \widehat{ce}_y^{(t,g)} \widehat{qe}_y^{(t,g)} + \widehat{ub}_y^{(t,g)} + \widehat{uc}_y^{(t,g)} + \widehat{ud}_y^{(t,g)} + \widehat{ue}_y^{(t,g)} \end{aligned}$$

where: u = per-pupil-place capital cost for schools;
 \widehat{ca} = cost of site per unit area for schools (land and 'additional' costs);¹
 \widehat{cb} = cost per unit area for building teaching and common facilities;
 \widehat{cc} = cost per unit area for building laboratories;
 \widehat{cd} = cost per unit area for building auditoria and gymnasia;
 \widehat{ce} = cost per unit area for building workshops and other special school facilities;
 \widehat{qa} = per-pupil-place area requirements for school sites;
 \widehat{qb} = per-pupil-place area requirements for teaching and common facilities;
 \widehat{qc} = per-pupil-place area requirements for laboratories;
 \widehat{qd} = per-pupil-place area requirements for auditoria and gymnasia;
 \widehat{qe} = per-pupil-place area requirements for workshops and other school facilities;
 \widehat{ub} = cost per-pupil-place for furniture and equipment, etc., for teaching and common facilities;
 \widehat{uc} = cost per-pupil-place for furniture and equipment, etc., for laboratories;
 \widehat{ud} = cost per-pupil-place for furniture and equipment, etc., for auditoria and gymnasia;
 \widehat{ue} = cost per-pupil-place for furniture and equipment, etc., for workshops and other school facilities.

Similarly, for student residences, the cost, in per-resident-place terms, is:

Formula 6

$$\widehat{u}_y^{(t,g)} = \widehat{cf}_y^{(t,g)} \widehat{qf}_y^{(t,g)} + \widehat{cg}_y^{(t,g)} \widehat{qg}_y^{(t,g)} + \widehat{ch}_y^{(t,g)} \widehat{qh}_y^{(t,g)} + \widehat{ug}_y^{(t,g)} + \widehat{uh}_y^{(t,g)}$$

where: \widehat{u} = per-resident place capital cost for student residences;
 \widehat{cf} = cost of site per unit area for student residences (land, and 'additional' costs);¹
 \widehat{cg} = cost per unit area for building student-residence bedrooms and dormitories;
 \widehat{ch} = cost per unit area for building student-residence common facilities, including kitchens, dining-rooms and service facilities;
 \widehat{qf} = per-resident-place area requirements for student residence-site;

1. 'Additional' costs may be defined as those costs of a building composed of: (a) drainage works beyond the manholes immediately adjacent to the school or residence; (b) roads, paths and hard areas for informal games (other than games areas prescribed in the building regulations); (c) water, gas and electricity mains (from meter point in building to connexion with the existing supply); (d) site layout and planting; (e) boundary walls and fencing; (f) playing field preparation including excavation; (g) caretaker's home (including drainage); (h) cycle sheds, greenhouses, etc. (if physically detached from the main school building or buildings); (i) other unusual items, such as electricity sub-stations, sewage disposal plants, etc.; (j) any contingency sum allocated to the above; (k) the proportion of preliminaries and insurances allocated to the above; (l) design and architectural fees in connexion with the above items.

\widehat{qg} = per-resident-place area requirements for student-residence bedrooms and dormitories;

\widehat{qh} = per-resident-place area requirements for student-residence common facilities, including kitchens, dining-rooms and service facilities;

\widehat{ug} = cost per-resident-place for furniture and equipment, etc., for student-residence bedrooms and dormitories;

\widehat{uh} = cost per-resident-place for furniture and equipment, etc., for student-residence common facilities, including kitchens, dining-rooms and service facilities.

For teacher residences, the cost in per-resident-place terms, is:

Formula 7

$$\bar{u}_y^{(t,g)} = \bar{c}i_y^{(t,g)} \widehat{qi}_y^{(t,g)} + \bar{c}j_y^{(t,g)} \widehat{qj}_y^{(t,g)} + \bar{u}f_y^{(t,g)}$$

where: \bar{u} = per-resident-place capital cost for teacher residences;

$\bar{c}i$ = cost of site per unit area for teacher residences (land, and 'additional' costs);¹

$\bar{c}j$ = cost per unit area for building teacher residences;

\widehat{qi} = per-resident-place area requirements for teacher-residence site;

\widehat{qj} = per-resident-place area requirements for teacher-residence buildings;

$\bar{u}f$ = cost per-resident-place for furniture and equipment, etc., for teacher residences.

Total capital costs for a specific type of education are the sum of the costs for the three categories; thus:

Formula 8.

$$U_y^{(t,g)} = u_y^{(t,g)} Q_y^{(t,g)} + \bar{u}_y^{(t,g)} + \bar{Q}_y^{(t,g)} \bar{u}_y^{(t,g)} \bar{Q}_y^{(t,g)}$$

where: U = total capital costs;

Q = number of pupil-places to be built;

\bar{Q} = number of resident-places to be built for students;

\bar{Q} = number of resident-places to be built for teachers.

The computation of the number of places to be built (Q , \bar{Q} and \bar{Q}) in any year would be simple if it could be assumed that the building period were one year. In that case it would be equal to the requirements for the following year less the existing stock that will be available in the following year. In reality, however, building programmes must take into account the fact that different types of buildings take different lengths of time to complete and even similar buildings may vary in the time taken for construction. The construction of educational buildings may, therefore, take one, two, three or more years.

Since Q_y , \bar{Q}_y and \bar{Q}_y in formula 8 denote the number of places (or its equivalent in building terms) to be built in a given year y and since the building time may vary, Q_y , \bar{Q}_y and \bar{Q}_y may include the building of places that will be available in years $y+1$, $y+2$, $y+3$, etc. While Q_y , \bar{Q}_y and \bar{Q}_y are equal to the amount of building, in unit-place equivalents, that will take place in a given year y , the number of

places to be completed in any subsequent year for the three categories are, for schools:

Formula 9

$$D_y^{(t,g)} = E_{y+1}^{(t,g)} - (1 - x_y^{(t,g)}) E_y^{(t,g)}$$

where: D = number of pupil-places to be completed for the following year;

x = proportion of existing pupil-places to be replaced for the following year;

and, for student residences:

Formula 10

$$\dot{D}_y^{(t,g)} = n_{y+1}^{(t,g)} E_{y+1}^{(t,g)} - (1 - \dot{x}_y^{(t,g)}) n_y^{(t,g)} E_y^{(t,g)}$$

where: \dot{D} = number of resident-places for students to be completed for the following year;

n = proportion of students in student residences;

\dot{x} = proportion of existing resident-places for students to be replaced for the following year.

The number of resident-places for teachers to be completed for the following year (\bar{D}) can be computed by modifying formula 10, i.e. instead of using enrolment (E), use the number of teachers, also in full-time equivalent (T).

Obviously, if all building took one year to complete, then $D = Q$ and $\dot{D} = \dot{Q}$ and $\bar{D} = \bar{Q}$ which might often be the case for primary education. If this condition cannot be assumed, then the number of places to be completed for the following year should be specified according to the proportion of places which require one, two, three, etc., years to build. Assuming that all building will require one, two or three years to complete, this can be expressed, for schools, as follows:

Formula 11

$$D_y^{(t,g)} = [\beta_y^{(t,g)} + \dot{\beta}_y^{(t,g)} + \bar{\beta}_y^{(t,g)}] D_y^{(t,g)}$$

where: β = proportion of pupil-places requiring one year to complete;

$\dot{\beta}$ = proportion of pupil-places requiring two years to complete;

$\bar{\beta}$ = proportion of pupil-places requiring three years to complete; and obviously,

$$\beta_y^{(t,g)} + \dot{\beta}_y^{(t,g)} + \bar{\beta}_y^{(t,g)} = 1.00$$

The amount of building in any year as measured in unit-place terms can now be shown as follows, assuming that all building will require one, two or three years to complete. (If this is not the case, the formula can easily be adjusted accordingly):

Formula 12

$$Q_y^{(t,g)} = \beta_y^{(t,g)} D_y^{(t,g)} + \dot{\beta}_{y+1}^{(t,g)} \dot{D}_{y+1}^{(t,g)} + \bar{\beta}_y^{(t,g)} \bar{D}_y^{(t,g)} + \delta_y^{(t,g)} \bar{\beta}_{y+2}^{(t,g)} D_{y+2}^{(t,g)} + \dot{\delta}_y^{(t,g)} \bar{\beta}_{y+1}^{(t,g)} \dot{D}_{y+1}^{(t,g)} + \bar{\delta}_y^{(t,g)} \bar{\beta}_y^{(t,g)} \bar{D}_y^{(t,g)}$$

where: θ = proportion of first-year building of pupil-places requiring two years to complete;
 $\dot{\theta}$ = proportion of second-year building of pupil-places requiring two years to complete;
 δ = proportion of first-year building of pupil-places requiring three years to complete;
 $\dot{\delta}$ = proportion of second-year building of pupil-places requiring three years to complete;
 $\bar{\delta}$ = proportion of third-year building of pupil-places requiring three years to complete.

and where:

$$\theta_y^{(t,g)} + \dot{\theta}_{y+1}^{(t,g)} = 1.00,$$

and

$$\dot{\theta}_{y-1}^{(t,g)} + \dot{\theta}_y^{(t,g)} = 1.00,$$

and

$$\delta_y^{(t,g)} + \dot{\delta}_{y+1}^{(t,g)} + \bar{\delta}_{y+2}^{(t,g)} = 1.00,$$

and

$$\delta_{y-1}^{(t,g)} + \dot{\delta}_y^{(t,g)} + \bar{\delta}_{y+1}^{(t,g)} = 1.00,$$

and

$$\delta_{y-2}^{(t,g)} + \dot{\delta}_{y-1}^{(t,g)} + \bar{\delta}_y^{(t,g)} = 1.00.$$

It should be noted that formula 9, which describes the number of pupil-places to be completed for the following year, assumes that a full-time pupil occupies one pupil-place in a school. In some cases, however, this might not be the case, especially in some types of education. For example, a certain type of education (or a proportion of it) may function on a two-shift basis, i.e. two full-time students may then require only one pupil-place. If this is the case, it may be taken into account by applying the utilization factor, which may operate in either direction, i.e. under- or over-utilization of pupil places. In such cases, formula 9 can be adjusted as follows:

Formula 9a

$$\widehat{D}_y^{(t,g)} = \frac{E_{y+1}^{(t,g)}}{\lambda_{y+1}^{(t,g)}} - \frac{(1 - \lambda_y^{(t,g)}) E_y^{(t,g)}}{\lambda_y^{(t,g)}}$$

where: \widehat{D} = number of pupil-places to be completed for the following year adjusted by the utilization factor;

λ = utilization factor.

Naturally, this utilization factor is not relevant for residences.

It was mentioned above that the model, when applied to the Asian region, had to be adapted to the particular conditions prevailing in the region—a lack of some

of the detailed information required and also considerable differences in school systems, school administration systems, accounting systems, etc.

For the cost analysis, the formulae 1 to 12 were adapted as follows:

Formula A-1

$$v_y^{(t,g)} = \frac{F_y^{(t,g)}}{f_y^{(t,g)} K_y^{(t,g)}} + \hat{v}e_y^{(t,g)} / u_y^{(t,g)} + \hat{v}h_y^{(t,g)} \dot{u}_y^{(t,g)}$$

where: K = proportion of average teacher salary to all recurrent costs excluding books, welfare, auxiliary, stipend and central administration.

This formula was used instead of formula 1 for the calculation of per-pupil recurrent cost, again separately for each type of education. Information was available in the region concerning average teacher salaries as well as the proportion of teachers' salaries in total recurrent costs (excluding books, welfare, auxiliary, stipend and central administration). Thus, per pupil recurrent cost for teacher salaries alone and for non-teaching personnel, general administration, maintenance and operation and instructional material other than books—combined—was obtained. In other words the expression:

$$\frac{F_y^{(t,g)}}{f_y^{(t,g)} K_y^{(t,g)}}$$

used in formula A-1 is equal to $\hat{v}a + \hat{v}b + \hat{v}c + \hat{v}d + \hat{v}i$ in formula 1. Information was also available concerning the per-pupil cost of books and the proportion of pupils receiving books. This was assumed, for the purpose of the projections, to vary over time and therefore the expression for book costs used in formula A-1 was identical to that in formula 3. The per-pupil cost of stipends was applied to enrolment in some types of teacher-training institutions and the expression used in formula A-1 was similar to that used in formula 3.

Total recurrent costs, by type and grade, were obtained by:

Formula A-2

$$V_y^{(t,g)} = v_y^{(t,g)} E_y^{(t,g)}$$

which is identical with formula 4. It should be noted, however, that these costs excluded welfare, auxiliary, and the central administration costs not attributable by level and type. The latter were assumed to be a fixed proportion of total recurrent costs (excluding stipends). Thus total recurrent costs for all types and grades combined were expressed by:

Formula A-3

$$V_y = v_y E_y + L_y(v_y E_y - \hat{v}h_y E_y)$$

where: L = percentage of total accounted for by central administration recurrent costs, excluding welfare, auxiliary and stipend costs.

The calculation of unit capital costs for schools was obtained by:

Formula A-4

$$u_y^{(t,g)} = \widehat{ua}_y^{(t,g)} + c_y^{(t,g)} q_y^{(t,g)} + \widehat{uk}_y^{(t,g)}$$

where: \widehat{ua} = cost per-pupil-place for school site;
 c = cost per unit area (square metres) for building schools;
 q = per pupil-place area requirements (square metres) for building schools;
 \widehat{uk} = cost per-pupil place for furniture and equipment, etc., for schools.

It can be seen that this formula is essentially similar to formula 5. The information for the region was not available in the same detailed form and thus \widehat{ua} in formula A-4 was substituted for \widehat{ca} times \widehat{qa} in formula 5. Similarly c was substituted for $\widehat{cb} + \widehat{cc} + \widehat{cd} + \widehat{ce}$; q was substituted for $\widehat{qb} + \widehat{qc} + \widehat{qd} + \widehat{qe}$; and \widehat{uk} was substituted for $\widehat{ub} + \widehat{uc} + \widehat{ud} + \widehat{ue}$ in formula 5.

Unit capital costs for student residences were calculated by:

Formula A-5

$$\widehat{u}_y^{(t,g)} = \widehat{ua}_y^{(t,g)} + \widehat{c}_y^{(t,g)} \widehat{q}_y^{(t,g)} + \widehat{uk}_y^{(t,g)}$$

where: \widehat{ua} = cost per-resident-place of site for student residences;
 \widehat{c} = cost per unit area (square metres) for building student residences;
 \widehat{q} = per-resident-place area requirements (square metres) for building student residences;
 \widehat{uk} = cost per-resident-place for furniture and equipment, etc., for student residences.

As in the preceding case \widehat{ua} in formula A-5 was substituted for \widehat{cf} times \widehat{qf} in formula 6, while \widehat{c} was substituted for $\widehat{cg} + \widehat{ch}$; \widehat{q} was substituted for \widehat{qg} and \widehat{qh} ; and \widehat{uk} was substituted for $\widehat{ug} + \widehat{uh}$.

Total capital costs were computed by:

Formula A-6

$$U_y^{(t,g)} = u_y^{(t,g)} [E_{y+1}^{(t,g)} - (1 - x_y^{(t,g)}) E_y^{(t,g)}] + \widehat{u}_y^{(t,g)} n_y^{(t,g)} E_y^{(t,g)}$$

which incorporates elements of formulae 8, 9 and 10. In the Asian Model it was assumed that all pupil-places and resident-places for students would take one year to complete and therefore the use of formulae 11 and 12 was not necessary. Utilization of all pupil-places was assumed to be on a one-shift basis. No provision for residences for teachers was made. Since precise information regarding existing residences for students was lacking, the number of residences for students was calculated on the basis of provision for a proportion of the total enrolment in certain types of education rather than on additional enrolment and replacement of existing resident-places.

Finally, total costs per year were obtained by adding recurrent and capital costs.

B. The statistical results

As regards the values of the individual cost items used in the actual calculation of the cost implications, data for the base year (or as near it as possible) for countries in each group has formed the basis for estimating the future. (It has been converted into US dollars and as such it is to be interpreted, subject to the limitations inherent in this procedure.) The estimates of costs for the future are based on the assumption of a constant price level. Movement in prices will obviously imply the need for corresponding adjustment.

As mentioned above, the basic unit used for the analysis of recurrent costs is the cost per pupil. It is affected by three main factors: the average annual salary of teachers; the pupil-teacher ratio; and the proportion of teachers' salaries to total recurrent costs. Recurrent costs other than salaries include charges for that part of general administration and supervision which can be allocated by level and type of education, maintenance and operation of educational establishments, instructional material and school libraries and salaries of non-teaching staff. The per-pupil cost thus includes items that are minimally essential for, and directed to, instructional work. It does not include auxiliary and welfare services such as school meals, school uniforms, transportation, teachers' housing, etc. which, desirable as they are, were assumed to form more appropriately part of the overall national welfare programme in which they should be costed. One of the reasons for this assumption was the difference in welfare and auxiliary services between countries of the region.

The provision of free textbooks in primary schools was considered to be of special importance in the light of the target to achieve universal and free education of a minimum of seven years duration. The experience of certain countries in the region indicates that the cost of textbooks in the first level of school education is about \$1 per child per year. It has been assumed that by 1980 all pupils in primary schools should receive free textbooks.

The cost of central administration not allocated by level and type of education was assumed to be 1 per cent of total recurrent costs for all levels of education, excluding stipends.

The provision of teachers' salaries is the most important item in recurrent costs. The salaries of teachers vary considerably from one country to another in Asia, as well as from one level of education to another. In making assumptions about the future levels of teachers' salaries, three factors were taken into account: (a) a general rise as a consequence of economic growth and higher standards of living; (b) an increase due to a contemplated improvement in qualifications; (c) in countries where salaries are unduly depressed in comparison with other similar occupations increases are necessary to attract to education a due share of higher level ability.

The model postulates a shift in the educational qualifications of the teaching force to a continuously rising level linked to appropriate salary incentives. It is envisaged that teachers for primary education will be prepared mainly in teacher-

training institutions (10 + 2 or 3) and for the secondary level in university institutions.

TABLE 4. Percentage distribution of new entrants to the teaching force at primary level of education, by qualification, 1964, 1970, 1975 and 1980

Qualification : 10 (basic schooling) + professional training	1964 group (estimated)			1970 group			1975 group			1980 group		
	A	B	C	A	B	C	A	B	C	A	B	C
10 or less	60	15	5	37	5	—	20	—	—	—	—	—
10 + 2	30	58	30	40	35	5	50	10	—	60	—	—
10 + 3	3	20	30	12	35	30	16	53	25	20	60	20
10 + 4 (or 12 + 2)	5	2	25	8	18	52	10	27	60	15	30	60
12 + 3 or more	2	5	10	3	7	13	4	10	5	15	10	20

Improvement is needed in the countries of the region in the provision of school libraries and instructional and audio-visual aids to increase the effectiveness of the teacher, and considerable strengthening is required in the science teaching programme. Educational administration and supervision is another key area for promoting qualitative improvements. For these reasons it was assumed that, for the purpose of qualitative improvements, the proportion of teachers' salaries to total recurrent costs will gradually decrease, i.e. that other recurrent costs will increase at a rate higher than that of teachers' salaries.

The pupil/teacher ratio is another important determinant of the level of recurrent costs. Obviously, the ratio of pupils to teachers becomes smaller as one goes up the educational ladder, due largely to increasing specialization in teaching at the secondary and higher levels. It has not been proved that a decrease in the pupil/teacher ratio by itself makes for qualitative improvement, and research studies tend to show that the two are not necessarily correlated.

In some types of education in many countries of the region a low pupil/teacher ratio indicates more an under-utilization of educational facilities than high quality. In these circumstances, a higher pupil/teacher ratio is strongly indicated. In order to minimize any possible disadvantage, it would be appropriate to give higher priority to having better qualified teachers equipped with sufficient aids, and supported with adequate supervision.

The cost items actually used for projections are shown in table 5.

For capital costs the unit used was the cost per-pupil-place for the additional enrolments at all levels, and for replacement of existing facilities.

Contrary to what happens to recurrent costs, capital costs (in constant prices) do not necessarily have an inherent tendency to rise. On the one hand, they may decrease as a result of improved productivity and better designing, but on the other hand rising standards and new needs may cause the opposite effect. Functional designing of school buildings is gaining ground and, as proved by the experience of some countries, not only makes substantial economies possible but also helps

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TABLE 5. Recurring costs per pupil, 1964 and 1980 (in U.S. dollars at constant prices)

	Group A		Group B		Group C	
	1964	1980	1964	1980	1964	1980
FIRST LEVEL (I-VII)						
Annual salary per teacher	\$240	\$372	\$258	\$400	\$580	\$783
Proportion increase	100%	155%	100%	155%	100%	135%
Pupil/teacher ratio	36	45	38	45	38	45
Teacher-salaries as a proportion of 'total' costs ¹	85%	80%	85%	80%	85%	80%
Per-pupil cost of textbooks	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Proportion of pupils receiving free textbooks	15%	100%	15%	100%	15%	100%
Per-pupil cost	\$8.00	\$11.30	\$8.15	\$12.10	\$18.10	\$22.75
Teacher-salaries	6.65	8.25	6.80	8.90	15.25	17.40
'Other' costs	1.20	2.05	1.20	2.20	2.70	4.35
Textbooks	0.15	1.00	0.15	1.00	0.15	1.00
SECOND LEVEL, LOWER STAGE (VIII-X)						
<i>General</i>						
Annual salary per teacher	\$450	\$652	\$680	\$918	\$900	\$1 134
Proportion increase	100%	145%	100%	135%	100%	126%
Pupil/teacher ratio	19	25	25	30	30	30
Teacher-salaries as a proportion of 'total' costs ¹	80%	75%	80%	75%	80%	75%
Per-pupil cost	\$29.60	\$34.80	\$34.00	\$40.80	\$37.50	\$50.40
Teacher-salaries	23.70	26.10	27.20	30.60	30.00	37.80
'Other' costs	5.90	8.70	6.80	10.20	7.50	12.60
<i>Vocational</i>						
Annual salary per teacher	\$450	\$652	\$680	\$918	\$900	\$1 134
Proportion increase	100%	145%	100%	145%	100%	126%
Pupil/teacher ratio	10	20	18	25	21	25
Teacher-salaries as a proportion of 'total' costs ¹	70%	65%	70%	65%	70%	65%
Per-pupil cost	\$64.30	\$50.15	\$54.00	\$56.45	\$61.20	\$69.75
Teacher-salaries	45.00	32.60	37.80	36.70	42.85	45.35
'Other' costs	19.30	17.55	16.20	19.75	18.35	24.40
SECOND LEVEL, UPPER STAGE (XI-XII)						
<i>General</i>						
Annual salary per teacher	\$450	\$652	\$680	\$918	\$900	\$1 134
Proportion increase	100%	145%	100%	145%	100%	126%
Pupil/teacher ratio	15	20	20	25	25	25

	Group A		Group B		Group C	
	1964	1980	1964	1980	1964	1980
<i>General, continued</i>						
Teacher-salaries as a proportion of 'total' costs ¹	80%	75%	80%	75%	80%	75%
Per-pupil cost	\$37.50	\$43.45	\$42.50	\$48.95	\$45.00	\$60.45
Teacher-salaries	30.00	32.60	34.00	36.70	36.00	45.35
'Other' costs	7.50	10.85	8.50	12.25	9.00	15.10
<i>Technical and vocational</i>						
Annual salary per teacher	\$950	\$1 197	\$1 020	\$1 285	\$1 425	\$1 795
Proportion increase	100%	126%	100%	126%	100%	126%
Pupil/teacher ratio	10	20	15	20	20	20
Teacher-salaries as a proportion of 'total' costs ¹	65%	60%	62%	60%	62%	60%
Per-pupil cost	\$146.15	\$99.75	\$109.70	\$107.10	\$114.90	\$149.50
Teacher-salaries	95.00	59.85	68.00	64.25	71.25	89.75
'Other' costs	51.15	39.90	41.70	42.85	43.65	59.75
<i>Teacher training²</i>						
Annual salary per teacher	\$800	\$1 008	\$940	\$1 184	\$1 100	\$1 386
Proportion increase	100%	126%	100%	126%	100%	126%
Pupil/teacher ratio	14	25	18	25	17	25
Teacher-salaries as a proportion of 'total' costs ¹	75%	70%	75%	70%	70%	65%
Per-pupil cost	\$76.20	\$57.55	\$69.60	\$67.65	\$92.45	\$85.30
Teacher-salaries	57.15	40.30	52.20	47.35	64.70	55.45
'Other' costs	19.05	17.25	17.40	20.30	27.75	29.85
Stipends	\$120	\$120	\$150	\$150	\$300	\$300
Proportion of pupils receiving stipends	30%	100%	30%	100%	30%	100%
<i>In-service training for primary school teachers</i>						
Salary per teacher ³	\$133	\$168	\$157	\$197	\$183	\$231
Pupil/teacher ratio	30	30	30	30	30	30
Teacher-salaries as a proportion of 'total' costs ¹	70%	70%	70%	70%	70%	70%
Per-pupil cost	\$22.35	\$24.00	\$25.45	\$27.35	\$28.70	\$31.00
Teacher-salaries	4.45	5.60	5.20	6.55	6.10	7.70
'Other' costs	1.90	2.40	2.25	2.80	2.60	3.30
Per diem and transportation	16.00	16.00	18.00	18.00	20.00	20.00
THIRD LEVEL (XIII +)						
<i>Science, science based and technological and technical (XIII-XIV)</i>						
Annual salary per teaching staff	\$2 000	\$2 520	\$2 000	\$2 520	\$2 240	\$2 822
Proportion increase	100%	126%	100%	126%	100%	126%

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	Group A		Group B		Group C	
	1964	1980	1964	1980	1964	1980
Student/teaching staff ratio	11	12	11	12	12	12
Teaching staff salaries as a proportion of 'total' costs ¹	60%	55%	60%	55%	60%	55%
Per-student cost	\$303	\$382	\$303	\$382	\$311	\$427
Teaching-staff salaries	182	210	182	210	187	235
'Other' costs	121	721	121	172	124	192
<i>Arts, humanities, social sciences, etc. (XIII +) and teacher training (XIII-XIV)</i>						
Annual salary per teaching staff	\$2 000	\$2 520	\$2 000	\$ 2520	\$2 240	\$ 2822
Proportion increase	100%	126%	100%	126%	100%	126%
Student/teaching staff ratio	23	22	23	22	23	22
Teaching-staff salaries as a proportion of 'total' costs ¹	70%	70%	70%	70%	70%	70%
Per-student cost	\$124	\$164	\$124	\$164	\$139	\$183
Teaching-staff salaries	87	115	87	115	97	128
'Other' costs	37	49	37	49	42	55
<i>In-service training for second-level school teachers</i>						
Salary per teaching staff ³	\$333	\$420	\$333	\$420	\$373	\$470
Student/teaching staff ratio	30	30	30	30	30	30
Salaries as a proportion of 'total' costs ¹	70%	70%	70%	70%	70%	70%
Per-student cost	\$40.85	\$45.00	\$45.85	\$50.00	\$52.80	\$57.35
Teaching-staff salaries	11.10	14.00	11.10	14.00	12.45	15.65
'Other' costs	4.75	6.00	4.75	6.00	5.35	6.70
<i>Per diem and transportation</i>	35.00	25.00	30.00	30.00	35.00	35.00

1. 'Total' costs as used here include teacher-salaries, other personnel costs, that part of general administration and supervision allocated by levels and type of education, maintenance and operation of educational establishments and instructional material other than textbooks. 'Other' costs include all of the items included in 'total' costs except teacher-salaries. Central administration not allocated by level and type of education was included in the over-all total recurring costs for all levels and types at the rate of 1 % of total all-level recurring costs, including textbooks but excluding stipends.
2. Including the teacher-training continuation course, Grade XIII.
3. Since the in-service training course is assumed to be of two-months' duration per year the salary per teaching staff was calculated on the basis of two-twelfths of the annual salary of teachers from the relevant level and type.

NOTE The estimates of 1964 unit recurring costs, teachers' salaries, proportion of salaries to 'total' cost, etc., were based on available data from each country, the source in most being 'Reports of the Unesco Regional Advisory team for Educational Planning in Asia', Unesco Regional Office for Education in Asia, Bangkok, 1965. Proportion of pupils receiving free textbooks at the first level in 1964 and proportion receiving stipends in teacher training are estimated. Figures in national currency have been converted into United States dollars at the exchange rates prevailing in December 1964.

in developing the flexibility so essential in instructional programmes. Capital costs can also be reduced by a better system of control, such as the determination of a maximum unit cost coupled with a minimum unit standard of accommodation. The architect and educator are left with discretion within these limits, so as to produce the best possible schools at a price that the state can afford.¹ For these reasons it was assumed for projections that the capital costs per-pupil-place will remain constant; the effect of rising standards being counterbalanced by improved productivity, better design and control.

TABLE 6. Capital costs per pupil-place, group A, B and C, 1964-80 (in U.S. dollars at constant prices)

	Net building cost per sq.m.	Area per pupil-place sq.m.	Net building cost per pupil-place	Site costs ¹	Furniture and equipment	Total
FIRST LEVEL (I-VII)	27	1.3	35	4	7	46
SECOND LEVEL (VIII-XII)						
Lower stage (VIII-X)						
General	40	3.0	120	36	30	186
Vocational	40	4.0	160	48	53	261
Upper stage (XI-XII)						
General	40	3.0	120	36	30	186
Technical	40	5.0	200	60	86	346
Teacher training ²	40	3.0	120	36	30	186
Residential facilities for pupils, teacher training ³	45	13.0	585	175	180	940
THIRD LEVEL (XIII +)						
Science, science-based and technological (XIII +) and technical (XIII-XIV)	60	16.0	960	480	640	2 080
Art, humanities, social sciences, etc. (XIII +) and teacher training (XIII-XIV)	60	6.0	360	180	120	660
Residential facilities for students, third level ⁴	55	13.0	715	357	225	1 297

1. Land and 'additional' costs. Explanation of 'additional' costs is given in footnote 1, p. 308.

2. Including the teacher-training continuation course. Grade XIII.

3. Proportion of students for whom residence is provided: 1964, 15 %; 1980, 80 %.

4. Proportion of students for whom residence is provided: 1964, 10 %; 1980, 30 %.

NOTE The estimates of 1964 capital costs per pupil-place and their components were based on the 'Report of the Unesco Regional Advisory Team for Educational Planning in Asia' and on a survey conducted by the Asian Regional Institute for School Building Research. Replacement of existing pupil-places and student residences was based on the assumption of replacing all 1964 first-level pupil-places by 1980, and using a gradually increasing replacement rate for 1964 second- and third-level pupil-places and student residences that reaches 2 per cent for second level and 1 per cent for third level by 1980.

1. See *United Kingdom: the use of cost analysis to improve the efficiency of school building*, Maureen Woodhall, volume III in this series.

TABLE 7. Estimated total costs by levels and types of education, 1964, 1970, 1975 and 1980 (in thousands of dollars)

Level and type of education	1964 (base year)				1970					
	Recurring cost	Stipends	Total recurring cost	Capital cost	Total cost	Recurring cost	Stipends	Total recurring cost	Capital cost	Total cost
FIRST LEVEL (I-VII)	1 061 803	.	1 061 803	309 131	1 370 934	1 619 670	.	1 619 670	503 225	2 122 895
SECOND LEVEL (VIII-XII)										
Lower stage (VIII-X)										
General	320 465	.	320 465			518 747	.	518 747		
Vocational	94 340		94 340			222 814		222 814		
Total	414 805	.	414 805	165 966	580 771	741 561	.	741 561	359 499	1 101 060
Upper stage (XI-XII)										
General	83 445	.	83 445			139 418	.	139 418		
Technical and vocational	117 150	.	117 150			206 896	.	206 896		
Teacher training ¹	39 019	27 662	66 681			43 287	40 046	83 333		
In-service training for primary school teachers	—	.	—	.	—	17 039	.	17 039	.	
Total (XI-XII)	239 614	27 662	267 276	92 863	360 139	406 640	40 046	446 686	146 398	593 084
Total second level (VIII-XII)	654 419	27 662	682 081	258 829	940 910	1 148 201	40 046	1 188 247	505 897	1 694 144
THIRD LEVEL (XIII +)										
Science and technological (XIII +) and technical course (XIII-XIV)	243 335	.	243 335	155 417	398 772	476 769	.	476 769	292 751	769 520
Arts and other (XIII +) and teacher training (XIII-XIV)	144 408	.	144 408	73 254	217 662	242 448	.	242 448	65 974	308 422
In-service training for second level teachers	—	.	—	.	—	7 351	.	7 351	.	7 351
Total third level (XIII +)	387 763	.	387 763	228 671	616 434	726 568	.	726 568	358 725	1 085 293
TOTAL (ALL LEVELS)	2 103 985	27 662	2 131 647	796 631	2 928 278	3 494 439	40 046	3 534 485	1 367 847	4 902 332
Administrative	2 104	.	2 104		2 104	3 495	.	3 495		3 495
Student residences		.		24 148	24 148		.		32 781	32 781
Total	2 106 089	27 662	2 133 751	820 779	2 954 530	3 497 934	40 046	3 537 980	1 400 628	4 938 608

1. Includes teacher-training continuation course (grade XIII).

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In estimating the capital cost, four elements have been taken into account: (a) the desirable area per pupil, including school and common services; (b) the net building cost per unit of area; (c) the cost of site; (d) the cost of furniture and equipment. The cost of construction showed much wider variation from country to country depending on materials and standards of design than variation in the minimum requirements of area per pupil.

It was assumed that residential facilities for pupils should be provided only at the higher level of education and in teacher-training institutions at the secondary level.

The assumptions used concerning the floor area and the cost at the various levels are given in table 6, and a summary of the cost projections in table 7.¹

The flexibility of the educational projections has been assessed in the light of the resources likely to be available in the future. This has been done in terms of the percentage of GNP to be devoted to education and in terms of the budgetary implications of the educational development.

In 1964 the share of educational expenditure in GNP varied significantly from country to country in the region, representing on average, less than 1 per cent in group A, more than 3 per cent in group B and below 5 per cent in group C. The educational projections presented in this study represent the telescoping into sixteen years of a process of educational development that in general took considerably longer in more developed countries. This would involve substantial increases in the volume of educational expenditures. As shown in table 7 educational costs² would increase from about \$2.9 billion in 1964 to \$9.4 billion by 1980, representing an average annual rate of increase of 7.5 per cent. Such data as are available indicate that between 1950 and 1960 educational expenditure in the region increased at an average annual rate of about 12 per cent.³

Over the period 1950 to 1964, the GNP of the region grew at about 4 per cent annually. This was not regarded as a satisfactory rate of growth and there were considerable pressures everywhere to accelerate it. The United Nations General Assembly Resolution 1710 (XVI) called upon Member States to intensify efforts to accelerate progress in the decade 1960 to 1970, 'taking as the objective a minimum annual rate of growth of aggregate national income of 5 per cent' at the end of the decade 1960-70. The countries of the region have in fact set even more ambitious targets; nearly everywhere in the region planning commissions have been established and have outlined development objectives. If the national development plans of the countries of the region, as they existed in 1964, were

1. For further details see *An Asian model of educational development*, op. cit.

2. For the purpose of the following analyses, cost estimates based on unit costs have been taken for expenditure. As mentioned earlier, actual expenditure may in certain circumstances be higher or lower, even in constant prices.

3. This average annual rate of increase for the period 1950-60 is not directly comparable with that resulting from projections (1964-80) in view of the fact that the former is based on actual educational expenditures in current prices while the latter is based on cost estimates in constant prices. The annual rate of increase of educational expenditure between 1950-60 should be adjusted downward in order to allow for an increase in the price level during the period.

aggregated, they would represent an over-all target of 6.4 per cent annual growth.¹

Taking into account these considerations, estimates of the future possible growth of GNP of the countries of the region have been based on three hypotheses: (a) a low estimate of an annual growth rate of 4 per cent; (b) a medium estimate of 5 per cent corresponding to the minimum objectives of the first UN Development Decade (1960-70); and (c) a high estimate of 6 per cent, which was somewhat lower than the combined objectives in the national development plans and also lower compared to what some of the countries in the region have actually achieved. Thus the three GNP growth assumptions used in table 8 are merely indicative and are not based on any projections of economic output. Their only purpose was to provide a certain frame of reference for testing the economic feasibility of the envisaged educational objectives.

TABLE 8. Cost of education in relation to GNP, 1964, 1970, 1975 and 1980

	Cost as percentage of GNP			
	1964	1970	1975	1980
<i>Group A</i>				
GNP annual growth at 4 per cent	0.93	1.70	2.37	3.11
GNP annual growth at 5 per cent	0.89	1.54	2.05	2.56
GNP annual growth at 6 per cent	0.86	1.40	1.78	2.12
<i>Group B</i>				
GNP annual growth at 4 per cent	3.43	4.76	5.57	6.18
GNP annual growth at 5 per cent	3.30	4.33	4.83	5.11
GNP annual growth at 6 per cent	3.17	3.93	4.19	4.22
<i>Group C</i>				
GNP annual growth at 4 per cent	4.65	5.32	6.11	6.47
GNP annual growth at 5 per cent	4.48	4.84	5.29	5.34
GNP annual growth at 6 per cent	4.31	4.40	4.59	4.42
<i>The region</i>				
GNP annual growth at 4 per cent	3.65	4.81	5.63	6.18
GNP annual growth at 5 per cent	3.51	4.38	4.87	5.10
GNP annual growth at 6 per cent	3.38	3.98	4.23	4.22

NOTE From 1960 GNP figures obtained from ECAFE, three alternative growth hypotheses were used: an average annual 4, 5 and 6 per cent rate of growth.

As the average annual growth rate of educational costs is higher than that assumed for GNP, it is obvious that the share of educational costs in the GNP will continue to rise. This represents a continuation of the past trend in the region where, between 1950 and 1960, the annual growth of educational expenditure was nearly three times the annual growth rate of GNP. For the region as a whole, the cost of education in 1980 would represent 6.18 per cent of GNP under the assumption of

1. The rate of growth for the developing countries of Asia as a whole, was 5.7 per cent in 1968 and 5.3 per cent for the period 1960-68. A marked improvement took place in the latter part of the sixties.

an annual rate of increase of GNP of 4 per cent, and 4.22 per cent if GNP increased by 6 per cent annually, the share of educational cost in GNP being lower in group A and higher in group C. Even for the group C, however, and under the 4 per cent annual growth hypothesis, the resulting share of educational costs in GNP is still feasible, although high, and is still below the corresponding share experienced in many developed countries around 1964.

In an attempt to analyse the budgetary implications of the projected educational development, i.e., to analyse public expenditure on education in relation to estimated public revenue, it was necessary to translate total educational cost in terms of estimated public expenditure on education. Policies concerning private education differ considerably from one country to another in the region. Available data indicates that, around 1964, public expenditure constituted approximately 80 per cent of total expenditure on education in group A, about 72 per cent in group B and 75 per cent in group C. With the extension of free and compulsory education, it seems reasonable to expect that the share of public expenditure would gradually increase. It has been assumed that the share of public expenditure in total expenditure on education will increase to 83 per cent in group A, to 78 per cent in group B and to 80 per cent in group C. Public revenues have been calculated on the basis of GNP estimates. Available information indicated that around 1964 public revenues represented about 7 per cent of GNP in group A, 17 per cent in group B and 20 per cent in group C. With the economic development

TABLE 9. Assumptions used for estimating public expenditures on school education and public revenues

	1964	1970	1975	1980
<i>Group A</i>				
Estimated public expenditures on school education as percentage of total costs of education	80	81	82	83
Estimated public revenues as percentage of GNP:				
Hypothesis I (low)	7	10	12.5	15
Hypothesis II (high)	7	12	16	20
<i>Group B</i>				
Estimated public expenditures on school education as percentage of total costs of education	72	74	76	78
Estimated public revenues as percentage of GNP:				
Hypothesis I (low)	17	19	21	24
Hypothesis II (high)	17	21	24	28
<i>Group C</i>				
Estimated public expenditures on school education as percentage of total costs of education	75	77	79	80
Estimated public revenues as percentage of GNP:				
Hypothesis I (low)	20	22	23.5	25
Hypothesis II (high)	20	24	27	30

of the countries of the region it was assumed that the share of public revenue in GNP will increase. For calculation of public revenue in the period until 1980 two hypotheses concerning the share of public revenue are used: hypothesis I (low increase in the share) and hypothesis II (high increase in the share).

Assumptions used for estimating public expenditure on education and public revenues are given in table 9.

TABLE 10. Estimated public expenditure on education in relation to estimated public revenue, 1964, 1970, 1975 and 1980

	Public expenditure as percentage of public revenue			
	1964	1970	1975	1980
<i>Public revenue hypothesis I (low)</i>				
<i>Group A</i>				
GNP annual growth at 4 per cent	10.63	13.74	15.53	17.19
GNP annual growth at 5 per cent	10.23	12.49	13.45	14.20
GNP annual growth at 6 per cent	9.84	11.36	11.67	11.74
<i>Group B</i>				
GNP annual growth at 4 per cent	14.51	18.54	20.17	20.11
GNP annual growth at 5 per cent	13.96	16.85	17.48	16.60
GNP annual growth at 6 per cent	13.44	15.33	15.16	13.73
<i>Group C</i>				
GNP annual growth at 4 per cent	17.44	18.63	20.54	20.70
GNP annual growth at 5 per cent	16.78	16.93	17.79	17.10
GNP annual growth at 6 per cent	16.16	15.40	15.43	14.15
<i>The region</i>				
GNP annual growth at 4 per cent	15.23	18.51	20.20	20.21
GNP annual growth at 5 per cent	14.66	16.82	17.50	16.68
GNP annual growth at 6 per cent	14.11	15.30	15.18	13.80
<i>Public revenue hypothesis II (high)</i>				
<i>Group A</i>				
GNP annual growth at 4 per cent	10.63	11.44	12.13	12.89
GNP annual growth at 5 per cent	10.23	10.41	10.51	10.64
GNP annual growth at 6 per cent	9.84	9.63	9.11	8.81
<i>Group B</i>				
GNP annual growth at 4 per cent	14.51	16.78	17.65	17.23
GNP annual growth at 5 per cent	13.96	15.24	15.29	14.23
GNP annual growth at 6 per cent	13.44	13.87	13.26	11.77
<i>Group C</i>				
GNP annual growth at 4 per cent	17.44	17.08	17.88	17.26
GNP annual growth at 5 per cent	16.78	15.52	15.49	14.25
GNP annual growth at 6 per cent	16.16	14.12	13.43	11.79
<i>The region</i>				
GNP annual growth at 4 per cent	15.23	16.79	17.63	17.17
GNP annual growth at 5 per cent	14.66	15.26	15.27	14.18
GNP annual growth at 6 per cent	14.11	13.88	13.25	11.73

NOTE From 1960 GNP figures obtained from ECAFE, three alternative growth hypotheses were used: an average annual 4, 5 and 6 per cent rate of growth.

On the basis of these assumptions, estimated public expenditure on school education has been related to estimated public revenues. The results, as shown in table 10, indicate that even with the low hypothesis concerning public revenues and a low hypothesis concerning GNP growth, the percentage of public revenues to be spent on education remains within reasonable limits and would be still lower than that experienced by many countries of the world around 1964.

Conclusions

The purpose of the Asian educational model was three-fold:

1. To project the implications of a series of educational hypotheses, deemed essential by the Ministers of education of the countries of the region, for the educational development of Asian Member States of Unesco, as a whole and sub-divided into three groups.
2. To provide a tool for the educational planners in the countries of the region, as far as the methodology of planning of education is concerned.
3. To provide a guideline for the educational planners in the region for assessing the values of the main educational assumptions, when detailed national data is not available.

Within this framework, and taking into account the special characteristics of the cost analysis, the purposes of the costing exercise as attempted in the Asian model can be defined as follows:

1. To provide a certain test of the economic feasibility of the educational projections.
2. To provide a tool for the national planners, for costing educational objectives.
3. To define the main cost items relevant to educational planning, and to identify their values for the three groups of countries within the region, which might serve as a guideline for educational planners in those countries where detailed cost data are not available.
4. To identify, for the three groups of countries within the region, areas where the efficiency of the educational system might be improved.

It has not as yet been possible to analyse and evaluate the annual achievements of the countries of the region. Nevertheless, data available suggest that the assumptions used for the projections, including the costing assumptions, are not beyond reasonable limits.

At present, no country in the region—as far as is known—has actually used the proposed methodology for establishing its own national educational projections. Nevertheless, several countries in the region did start to investigate the potential use of this methodology, and might perhaps use it in the future. Also, some of the values of the costing assumptions have actually been used in several countries

of the region to check the feasibility of their own costing procedures. The results of these exercises are at present not available.

It seems that, for a wider use of this procedure, it should be tested within a specific framework of national conditions in several countries within and perhaps also outside the Asian region; this is feasible mainly due to the simplicity and the flexibility of the conception of the model in spite of the apparent complexity of its formulation. It is true that this model has its limitations; it does not (and is not intended to) make a precise cost forecast. Yet its main advantage, as noted earlier, is that it is a very helpful tool in the preliminary stages of the preparation of an educational plan. With such a model one can easily evaluate the cost and financial implications of possible targets and thus choose a target which *is* feasible. The educational planners could then prepare a more refined presentation of the cost and financial consequences of the target selected by the authorities. For this reason the model could at least make a significant contribution to the methodology of planning education in several countries.

Commentary by IIEP

The authors of the Asian development model have not been able to give an example of their model actually being used to work out capital and recurrent costs based on different assumptions—they have only been able to show the most likely results. And the model has not yet been used in any of the individual countries of the region.

However, neither of these two points detract from the importance of this case study. The Asian model draws attention to several crucial points which are not covered by any of the other case studies in this series. It demonstrates the potential use of models in making projections of capital and recurrent costs and it also deals indirectly with the use of typologies in cost projections.

The recurrent cost model was basically very simple, expressing total educational costs in terms of teacher costs and other costs, with other costs expressed as a percentage of teacher costs. The teacher costs per pupil were related to only four factors: the pupil/teacher ratio; the average salary per teacher by qualification; the qualification structure of the teaching force; and the rate of growth in real terms of teachers' salaries. No account was taken of the changing experience structure of the teaching force. Although this can have considerable impact on the average cost per teacher, the omission here is not too serious as the authors are only attempting to show the broad order of magnitude of the costs of education in the Asian region for various years in the future. At no stage do they claim that their figures are anything more than a first approximation. The capital cost model was equally simple, separating out the cost of land, the per-pupil area of

teaching and residential buildings and the cost per square metre of construction.

However, the process by which these simple models were derived is interesting. For example, in drawing up the first equations for recurrent costs, all possible items of recurrent expenditure were included—from the per-pupil salary cost to the per-pupil cost of instructional materials other than books. When carrying out a costing exercise the educational cost analyst is advised to turn to these lists, both of capital and recurrent expenditure, to check whether he has omitted to take account of any of them.

In the original model only two items seem to have been omitted; in the recurrent model the cost of teachers' pensions, and in the capital model, site supervision and other related fees. Of course it is not certain that these have been left out as they could have been included under some other heading. However, as the items are not necessarily directly related to any other items, it is our view that they would warrant separate treatment as variables in any model as detailed as this one.

The main purpose of the Asian model was to give the countries concerned, and Unesco, a rough indication of the over-all financial feasibility of certain targets set for groups of countries. It is not in any sense an optimization model and thus does not attempt to express some of the exogenous variables in terms of other exogenous variables. As the authors point out, the model was designed to be used with a computer. Different assumptions about the variables could be made and answers quickly obtained as to the feasibility of implementing them.

In designing the model it was realized that, although each of the eighteen countries in the region differed from each other in many respects, they had many things in common. The task would have been too long and complicated had projections for all the different assumptions been made for each country. Though the countries were grouped on the basis of their first level enrolment ratio they were found to be similar in many other respects. For instance, the countries with the lowest first-level enrolment also had the lowest GNP *per capita*; the highest proportion of the economically active population in agriculture; the lowest *per capita* energy consumption; etc.

Countries which have certain economic, demographic and educational similarities often have other factors in common—the reasoning behind the use of typologies in educational planning. Obviously it is better to deal with information and data from each country individually but in many cases data on a particular country are not available.

In another study in this series¹ data on the survival indices for primary school teachers were not available for the country under consideration, thus data from a neighbouring country at roughly the same level of economic and educational development were used instead. Normally, the educational planner should attempt to obtain data from several similar countries and from these establish a typology for countries at a given level of development. Similarly, when projections are being made in a particular country, a typology of countries slightly more developed

1. *Tanzania: factors influencing change in teacher's basic salaries*, see page 37.

than the country under consideration will give the planner some indication about the possible future relationship between different variables.

In using a typology the planner must realize that he cannot discover what the present or future *should* be like, but only what they *could* be like—there is no reason to suppose that other countries have pursued an optimum or near optimum path of development. All that is known is that they have followed a feasible path of development.

Models of the type described in this paper can be very useful to planners in individual countries; the very simplicity of such models should ensure their use. In the preliminary stages of planning various alternatives for the long-term development of an educational system will be under discussion—if a simple model is used the approximate capital and recurrent costs of the various alternatives can be obtained quickly. Some of these alternatives can then be rejected because the preliminary cost estimates show them to be too expensive; others will be rejected because they are not ambitious enough. Thus the number of alternatives that the planner has to cost in a detailed fashion is considerably reduced. Such models also enable the planner to discover the effects of changes in any given variable. He can thus decide which variables he must devote most attention to and which are of only marginal importance.

Both simple models and typologies are useful tools for educational cost evaluation when used in conjunction with other techniques. Simple cost models both provide the planner with a means to check the financial feasibility of plans based on certain assumptions before detailed costing takes place and also enable him to discover the relative importance of different variables. Typologies present the planner with an indication of either the present or future order of magnitude of unknown variables.

Chile

10

Evaluating the expansion of a vocational training programme

prepared by Lucila Arrigazzi

This case study was prepared by Miss Lucila Arrigazzi, an IIEP consultant from Argentina working in collaboration with Mr. Jacques Hallak, Deputy Investigator of the project. In its preparation Miss Arrigazzi has taken into consideration comments made by several experts, including Mr. A. Alberti, the Director of Inacap.

Introduction

In 1965, a mission from the International Bank for Reconstruction and Development (IBRD) was sent to Chile to evaluate a loan proposal for a large-scale expansion of vocational training to be undertaken by the National Training Institute.¹

The usual practice of the bank in appraising an educational project of this sort had previously been, first, to determine whether the types and number of persons to be trained were in line with the manpower needs of the economy; second, to examine the costs, efficiency and qualitative aspects of the project; and third, to judge its practical feasibility in terms of the availability of teachers, local resources, construction capacity and so forth.

In this instance, the bank's mission went a step further and added a 'cost-benefit' analysis. Its purpose was to weigh the likely long-term economic benefits of the projects to the Chilean economy against the costs involved, in order to determine whether the prospective social 'rate of return' was sufficiently favourable—compared with alternative uses of scarce funds—to warrant the investment.

As it turned out, the rate of return which the mission calculated was very favourable. The bank decided not only to make the requested loan to Chile but to experiment elsewhere with using cost-benefit analysis in the education sector.

The purpose of the present case study is not to criticize the mission's report on the Inacap project, but rather to learn from it. What is involved in applying cost-benefit analysis in an educational situation of this sort? What is its basic purpose, rationale and approach? What methodologies and types of data are employed? What kinds of difficulties are involved? What are the advantages to decision-making—and the limitations and risks involved?

These are important questions for any country that wants to get the most from limited resources. They are especially important questions for developing countries, whose needs are without limit but whose present resources are exceedingly scarce.

In trying to compute the costs and benefits of an educational project a host of variables must be considered. There are never enough solid facts for the purpose. Worst of all, many of the costs to be measured and virtually all the benefits lie somewhere off in the future and can only be approximately estimated now. Thus, to do a cost-benefit analysis, one must be willing to strip the real-life situation to its simplest dimensions—in short, to over-simplify it—and then to rough in

1. Training activities had been initiated in 1960 by the Servicio de Capacitación Técnica (SCT) but were being transferred to a newly established National Training Institute (Instituto Nacional de Capacitación), hereafter called Inacap. Inacap is a public body, affiliated to CORFO (Corporación de Fomento de la Producción) which formulated Chile's first economic plan (for 1961–70). Inacap's Directorate council includes representatives of CORFO, the Ministries of education and labour, workers, employers and the universities. Its financing comes largely from CORFO, the Ministry of education and foreign assistance.

factual gaps with plausible assumptions, estimates and guesses, thereby risking predictions which later may prove to be wrong.

The Chilean study had many inescapable shortcomings. For one thing, the bank mission confined itself to measuring only the *direct economic* benefits. Thus its final 'rate of return', by excluding the very real but immeasurable non-economic and indirect economic benefits, was bound to cover only part of the full yields on the proposed investment in the vocational training programme.

Furthermore, the mission, while trying something new and complicated, was severely handicapped by a shortage of both time and reliable data. Nor did it study the costs and benefits of alternative methods of training. Finally, it must be remembered throughout that the mission was not conducting an academic exercise designed to provide the basis for a case study such as this; it was simply trying to get the minimum of information and guidance needed by the bank for its loan decision. Hence there are many places in the mission's report where it has failed to expose its statistical and analytical tracks as fully as would have been desirable for the purposes of this study.

None the less, the Inacap report was a useful and interesting pioneer venture. It not only served the bank's purposes well but it provided, even if unintentionally, a variety of useful lessons for others.

The sections which follow are arranged in the same sequence as the steps taken by the mission: *first*, the justification of the project and its enrolment targets in terms of the Chilean economy's needs for qualified manpower; *second*, the analysis of the project's *costs*; *third*, the analysis of its prospective economic *benefits* to society; and *fourth*, the resultant rate of return to society on the investment involved.

Each section first summarizes how the mission dealt with the particular matter and the conclusions it reached, then presents a critical commentary intended to bring out useful lessons for the future. The final chapter contains a summary of conclusions.

I. Assessment of the training targets

Three questions faced the mission at the outset: Was Inacap's current training efficient and effective? Was there a real need for expanding its courses for semi-skilled workers and by how much? Was this the best way to meet the need?

A. The proposed project and enrolment targets

The main aim of Inacap was broadly that of 'providing workers with the means and conditions for their technical preparation and occupational promotion

within the framework of the national plans for economic and social development'. To this end it conducted a wide variety of industrial, mining, agricultural and fishery training programmes for numerous groups—ranging from young school-leavers and the physically handicapped to skilled workers already employed. Among other things it aided industrial enterprises to conduct their own on-the-job training programmes.

All these activities were in the nature of 'non-formal' training, in the sense that they took place outside the formal educational structure.¹

The project in question was confined to three specific types of Inacap programmes:

1. *Basic training (B) courses*, to upgrade *unskilled* into *semi-skilled* workers. These full-time courses, three to six months in duration, covered a variety of trades. They were designed especially for (a) young people who possessed a prescribed minimum of general education but no technical training; (b) other unemployed persons, and (c) employed workers wishing to change jobs or to migrate to another area.
2. *Further training (F) courses*, to upgrade *semi-skilled* into *skilled* workers. These evening courses, ranging from ten to twenty weeks, covered a variety of trades and were intended mainly for experienced workers with daytime jobs.
3. *Specialization (S) courses*, to provide experienced *skilled* workers with more advanced special skills. These evening courses ranged in length from five to fifteen weeks.

The bank team was satisfied that these courses were well designed and of a practical nature. They had benefitted from International Labour Organization (ILO) technical assistance for several years and this would continue. The courses were short and intensive; the teaching was highly practical—carefully geared to current industry practices—and there was generally one instructor and one assistant to every sixteen students in workshops, and one to twenty in related classroom work. A total of twenty different types of courses had been prepared, based on detailed

TABLE 1. Duration of Inacap courses

Courses	Duration	Number of hours taught	Attendance
Basic training	3 to 6 months	500 to 1,000	8 hours per day
Further training	10 to 20 weeks	150 to 200	3 hours per evening
Specialization	5 to 15 weeks	40 to 80	3 hours per evening

NOTE There are other possibilities, particularly in agricultural centres.

1. Under the educational reform of 1966, elementary education in Chile was extended from 6 to 8 years. From the 9th grade on, a student could pursue a general secondary education programme or either of two technical courses: a full-time (four years) 'in-school' vocational programme, or a three-year apprenticeship programme which includes some part-time attendance at school. The apprenticeship programme, which builds a bridge between 'formal' and 'non-formal' training programmes, was placed under Inacap control.

occupational analysis; standard syllabuses, teaching materials, equipment lists and workshop layouts had been developed for each course. Table 1 summarizes the duration of the (B), (F) and (S) courses.

The geographical distribution and the enrolment targets had been determined on the basis of labour market surveys in all areas. (The nature of these surveys is not disclosed in the documentation available.)

These three Inacap programmes had started in 1960 and had already grown considerably reaching an estimated 16,000 'completions'¹ in 1965, according to the mission report.

The proposed target was to expand the annual output of the three programmes by an additional 14,000 trainees—an 80 per cent increase which would bring the over-all total to 30,000.² How feasible and practical was this proposed expansion in terms of Chile's construction capacity, and the supply of technical instructors, and was Inacap the best instrument for the purpose?

Though the evidence was not elaborated in its report, the mission was clearly satisfied on these points. The construction industry could provide the necessary new facilities. An adequate supply of good instructors (to be trained by Inacap) could be found, it was believed, because they would enjoy salaries and working conditions equivalent to those in industry (and higher than secondary vocational school instructors). All indications were that the supply of potential trainees was abundant; hence there would be no problem filling the newly created 'places'.

It is not clear how thoroughly the mission looked into the question as to whether Inacap was the best instrument for the purpose, but its report did make some relevant observations. One possible alternative was the full-time vocational secondary school, but up to that point they had a record of high cost, poor quality and high drop-out rates (about 70 per cent in the case of industrial type training). They were to be improved, but even so they were not considered a substitute for supplying the Inacap type of training, even taking into consideration

1. With courses taking place at different levels and lasting from forty to 1,000 hours it is not really significant to talk in terms of total completions. Nor is the percentage increase in completions necessarily relevant. However, other information might well not be available. Nevertheless, an attempt was made to estimate from the mission report the total increase in man-hours of training that the project would create. This turned out to be over 130 per cent.

2. Actually the 1964-65 total proved to be somewhat less, according to the following revised figures later reported by Inacap. This meant that the target required in fact more than a doubling of the previous peak level.

	1960	1961	1962	1963	1964	1965
Number of trainees completing Inacap training programmes	85	946	1 886	4 279	10 131	12 197

NOTE Includes basic training, further training and specialization courses within centres and Programmes within industry. The latter amounted to 9,478 trainees for the period 1960-65.

SOURCE A. Alberti and G. del Campo, *El desarrollo de los recursos humanos para la industrialización en Chile*, Santiago de Chile, Inacap, 1966.
Inacap/Corfo, *Un año al servicio de los trabajadores*, Santiago de Chile, 1966.

the 1966 educational reform. Another possibility was on-the-job training by industrial firms, but this was seriously under-developed in Chile and confined to a relatively few firms. Inacap was helping to expand it, but the expansion would probably be slow. Finally, other government and private agencies also had training programmes, but they were relatively small. In short, because Inacap was the biggest supplier and was evidently doing a good job the IBRD mission did not feel it worth its while to propose and study alternative methods of training.

B. The manpower requirements

Systematic technical training—both formal and non-formal—had played a relatively small role in developing Chile's labour force up to 1965. On the other hand, for a developing country, Chile's labour force had a relatively high standard of education. A recent study by Pratt, Loeb and Davis¹ had shown that well over half the total working population, including farmers, had attended primary school and another one-fifth had gone to secondary school. Less than 4 per cent however, had received technical training. (See table 2.)

TABLE 2. Educational level of total working population

Without education	Primary	Secondary		University	Unspecified	Total	
		General	Other ¹			Percentage	Thousands
15.6	56.5	18.8 ²	3.5 ²	2.5	3.1	100	2 228.8

1. Commercial, industrial and agricultural.

2. Those with three to five years of secondary education are as follows: general, 8.3 per cent; industrial, 0.7 per cent; agricultural, 0.1 per cent.

SOURCE Unesco, (unpublished data) and W. J. Platt *et al.*, op. cit.

Another study, by Inacap itself, based on a sample survey of 22,000 workers (summarized in table 3) showed a rather larger proportion with technical

TABLE 3. Educational profile of 22,000 workers (percentage)

Category of workers	Primary education		Secondary education			Technical courses	Total
	Incomplete	Complete	Industrial		Academic		
			Incomplete	Complete			
Skilled	8.15	54.0	14.5	9.2	8.4	5.75	100
Semi-skilled	21.45	58.95	3.85	1.02	13.3	1.43	100
Unskilled	23.9	58.1	5.7	2.9	8.5	0.9	100

NOTE The number of workers in each category is not known.

SOURCE An unpublished study by the World Bank staff.

1. W. J. Platt, A. M. Loeb and R. Davis, *Manpower and educational planning in Chile: a preliminary study*, Santiago de Chile, California program of technical cooperation, 1964.

training particularly in the 'skilled' category (possibly because the sample concentrated more on industrial workers). Even in this study, however, workers with secondary academic education considerably outnumbered those with technical training.

In any event, Chilean industry was growing and the mission was convinced from all the available evidence that there already existed a widespread shortage of qualified workers.¹ It was reasonable, therefore, to expand technical training. But by how much?

Unfortunately a good survey of future manpower needs was not available, and so the mission was obliged to make some rough-and-ready projections, using the standard 'stock-flow' method in the following stages:

1. The 1964 'stock' of skilled and semi-skilled industrial workers in Chile was estimated at between 330,000 and 350,000.
2. It was assumed that this stock would have to grow proportionately with the economy. The economy had grown at 3.7 per cent annually between 1960 and 1965 and it was hoped to accelerate this growth. The mission therefore concluded that the *minimum* growth of the stock of qualified industrial workers should be 5 per cent yearly.
3. A 4 per cent requirement was added to compensate for yearly depletion of the stock through retirements and death.
4. It was further assumed that an additional 4 per cent of the stock would need training each year to keep abreast of new techniques, new job specifications, etc.
5. By adding the foregoing together (5 + 4 + 4), the mission concluded (conservatively, it felt) that a flow of new trainees equal to at least 13 per cent of the stock, or 43,000 workers, would be needed annually for a number of years ahead.²

The mission broke this over-all estimate down into the categories shown in table 4.

TABLE 4. Number of skilled and semi-skilled workers required per year in the near future

Category	Number	Category	Number
Agriculture	3 500	Services	2 800
Fishing	1 200	Commerce	1 000
Mining	3 400	Transport	1 600
Industry	17 000	Other	500
Construction	12 000	TOTAL	43 000

In this context the size of the expansion was set, that is, Inacap would supply 30,000 of the 43,000 required trainees annually, or 75 per cent. Such proportion

1. It must be noticed that although unemployment in Chile is important—of the order of 5.5 per cent of the active population in 1960—there is some evidence that it is concentrated among unqualified workers and young people.

2. The whole of the manpower projection was, of course, very simplified. However, it should be borne in mind that all the IBRD mission was attempting was to show the order of magnitude of the demand.

was considered appropriate to conserve capital, recurrent costs and teachers, and to assure that growth would not out-run the capacity of Inacap to manage the programme well.

In this way, the mission arrived at its first critical conclusion: an expansion of as much as 14,000 trained workers per year was needed by the Chilean economy, and the Inacap programme seemed a good way to bring it about.

C. Commentary on the manpower estimates

The first comment is that a seemingly small change of assumptions about manpower prospects can produce a relatively large change in the estimated benefits and rate of return. In the present case, for example, if the mission had assumed a 4 per cent growth rate needed for the stock rather than 5 per cent, and only 3 per cent rather than 4 per cent for annual replacements and for necessary retraining, these changes in assumptions would have reduced their 43,000 estimate of trainees needed per year to about 33,000—very close to the Inacap target, without regard to other sources of training.¹

This in turn might lead one to expect an early reduction in the shortage of the qualified labour, a narrowing of wage differentials between skilled and unskilled workers, and possibly some unemployment among the newly trained. All this would have a decided effect on the estimate of 'benefits', and thus on the rate of return.

The second point is that the mission appears to have considered the three types of manpower—semi-skilled, skilled and specialized—together. The manpower projection gives no indication regarding the proportion of each type in the total. Thus there is no real indication from the estimates whether the output from Inacap would meet the demand for particular skills. As with the first point, a small change in the assumptions could have a very large effect on the demand.

Thirdly, a fairly wide error in forecasting manpower needs is more than a slight possibility, given the doubtful nature of manpower data, particularly in developing countries. In the present case, for example, it is interesting to compare the mission's estimates of 1964 labour stocks, and of needed annual additions to stocks, with figures given in two other studies. The three sets of figures, which in fact are not strictly comparable but might easily be taken to be, are given in table 5. The divergences in 'stock' figures between 1960 and 1966 are striking, not to mention the differences in estimates of future growth and replacement needs.

With the limited information available on the manpower projections it is very difficult not to feel that they are really an *ex post facto* justification.

1. No quantitative information on other forms of training appears to be available.

TABLE 5. Some relevant data from two manpower studies and comparison with the mission's estimations

Study and date of publication	1. Stock of skilled and semi-skilled workers			2. Net increase per year			Average total requirements per year 2 + Replacement
	1960	Observed 1964/65	1966	Assumed 1970	Period	Percentage	
SCT (1965)	442,000 ¹			582,300 ¹	1960-70	2.8	18 730 ²
Households survey (1966)			605,800 ¹	—	1960-66	5.5	—
IBRD Mission 1965	—	330-350,000 ³			not stated	5.5	29 750 ⁴

NOTES 1. In mining, manufacturing, construction, transport, electricity, gas and water.

2. Around 19,300 between 1965-70 on average.

3. All sectors.

4. 43,000 if 4 per cent retraining is included.

SOURCES CORFO, *Necesidades de mano de obra, educación y formación profesional: un enfoque global*, Santiago de Chile, Servicio de Cooperación Técnica, 1965.

Dirección de Estadística y Censos, *Muestra nacional de hogares, la encuesta suplementaria sobre niveles de instrucción y calificación de la mano de obra*, Santiago de Chile, 1966.

II. The analysis of costs

The mission made separate estimates of *capital* costs, *recurrent* costs and *opportunity* costs of the Inacap project. It should be remembered that the aim was to estimate *social* costs, rather than costs to the individual trainees, to industry, or to the World Bank.

A. Capital costs

The expanded Inacap programmes were to be conducted in three types of premises:

1. *Inacap centres*: Seven existing ones were to receive additional equipment and three of these were to be structurally modified. Seven *new* centres were to be constructed and fully equipped.
2. *Industrial schools*: These facilities were loaned to Inacap by the Ministry of education at no cost; but Inacap was to supply new equipment for the nine industrial schools previously in use, and for eighteen additional schools to be made available.
3. *Mobile workshops*: Five new mobile workshops were to be added to the six already in use. These were to provide training in mining in remote areas.

Numerous variables had to be taken into account in calculating the costs of construction and equipment: (i) three types of instructional facilities; (ii) three types of programmes (B, F and S), varying between full-time and part-time, and in equipment and space requirements; and (iii) twenty types of course (each speciality having its own space and equipment requirements). The mix of the foregoing variables was defined by the enrolment targets. The basic unit for calculating costs was not the student but the course (the typical workshop being designed to accommodate a group of sixteen students, and each classroom twenty students).

When the proportions of these variables had been chosen, the calculation of capital costs became a matter of applying the appropriate space and equipment factors and costing them. It is noteworthy that these factors were essentially based on previous Inacap practice and had proved to be successful; no major changes or innovations were apparently contemplated. Thus it was essentially a question of doing more of the same, though with a different enrolment cross-section.

Construction costs were evidently based on recent experience in Chile (\$62.50 per sq. metre, allowing 40 sq. metres per course for classrooms and from 60 sq. metres to 300 sq. metres for workshops, depending on the speciality). Equipment lists were priced out at 'bare minimum', allowing for economies of bulk purchasing and, following bank policy, international competitive bidding. Also following bank practice, a 10 per cent contingency allowance was built in for both construction and equipment.

Most of the space and equipment costs were allocable to teaching specific courses, but some equipment items—to be shared by different courses—were allocated to administration.

A breakdown of construction and equipment costs for the project is given in table 6.

TABLE 6. Equipment and construction costs of the expansion programme

Items	Costs US \$ ¹	Students to be added per year (part-time and full-time)	Courses to be added
Teaching equipment	2 667 000		
Inacap centers	1 584 000	7 388	54
Industrial schools	877 000	5 388	71
Mining units	206 000	1 360	—
Central administration	75 000		
Audiovisual, teaching aid	48 540		
Printing equipment	18 210		
Motor transportation	8 250		
10 per cent contingency	274 200		
TOTAL equipment costs ²	3 016 200		
TOTAL construction costs	765 600		
TOTAL capital costs	3 781 800		

1. 1964 exchange rate: 2.4 escudos to the dollar.

2. It includes allowances of 5 per cent for spares of equipment and 5 per cent for local transport, insurance during the transit and installation.

Table 7 shows the breakdown between foreign currency and local currency requirements for capital purposes. Over 90 per cent of the equipment costs required foreign currency, whereas over 90 per cent of the construction costs (involving mainly local labour and materials) could be financed with local currency. The World Bank would therefore confine its loan to foreign currency requirements. The mission made a special point of ensuring that Inacap was in a position to meet local currency requirements.

TABLE 7. Capital costs of the expansion programme (US \$)

Items	Total	Foreign exchange	Local currency
Equipment	3 016 200	2 714 580	301 620
Construction	765 600	38 280	727 320
TOTAL	3 781 800	2 752 860	1 028 940

B. Recurrent costs

The report gives an over-all estimates of \$3,250,000 for annual recurrent costs, including \$150,000 per year for continuing technical assistance (mostly from

ILO). In contrast to its detailed treatment of capital costs, however, the report says very little about recurrent costs.

It can be safely assumed; however, as in most education cases, that the bulk of recurrent costs are accounted for by teacher costs. In this connexion the report notes that the 1964 staff of 88 instructors must be supplemented by 224 new ones (comprised of an unspecified mixture of full-time and part-time). It says nothing about their salaries other than that they would be 'competitive with what industry offers'.

C. Opportunity costs

'Opportunity costs' constitute the third category of costs. These represent the production which would have resulted (the social benefit) if the students concerned had been working rather than training. It is assumed that if the training is effective the opportunity costs will be more than recouped later by increased production and earnings. Opportunity costs are not, of course, applicable if the students are below working age (as for primary school pupils) or if there is good reason to believe that the alternative to training would have been unemployment.

The usual method of calculating opportunity costs is to use the estimated income forgone by the trainees, on the assumption that this private loss of earnings is an approximate reflection of the production lost to the economy.

Following this method, the mission assumed (implicitly or explicitly): (a) that *all* the full-time trainees in the basic training programme would otherwise have been fully employed, at median wages for unskilled workers, (b) that all the trainees in the further training and specialization programmes (taking evening courses) would otherwise have been working overtime, at median rates for semi-skilled and skilled workers, respectively.¹

On the basis of the foregoing hypotheses, the mission estimated a total of 'earnings forgone' by the additional trainees in the expanded programmes of \$920,000 per annum. The summary calculations are given in table 8.

D. Commentary on the cost analysis

Three general points applying to the whole treatment of costs first merit attention. They concern the relative attention given by the mission to different categories of cost, its preoccupation with *incremental* costs, and the apparent absence of concern over educational innovation and internal operating efficiency of the Inacap programmes.

1. To justify this 'full employment' assumption, the report said, '... given the current scarcity of industrial personnel in Chile, it is proper to account for this contribution in full'. It does, however, seem doubtful that with 5 per cent over-all unemployment all unskilled workers going into the basic training programme would not be replaced by unemployed workers, and even more doubtful that those pursuing the evening courses would have been working overtime.

TABLE 8. Earnings forgone by the trainees during one-year training programme

	Number of trainees ¹	Man-hours (thousands) ²	Wage (\$/hour)	Total (thousands of \$)
Basic training	5,000	3,000	0.130	390
Further training	7,500	1,310	0.365	480
Specialization	1,500	90	0.555	50
TOTAL	14,000			920

1. In round numbers.

2. Average number of hours per trainee.

SOURCE An unpublished study by World Bank staff.

The summary breakdown of estimated over-all annual costs (table 10), shows that *recurrent costs* accounted for roughly *three-quarters* of the total, *opportunity costs* for about one-fifth, and *capital costs* for substantially less than *one-tenth*. Logically, in doing a rate-of-return estimate, one would be especially concerned to obtain the 'hardest' possible estimate of recurrent costs, since these accounted for by far the largest share of the total. By the same token, one would be least concerned with precision and reliability with respect to capital costs, since they were a relatively minor factor. Yet the mission appears to have done the opposite. One can reasonably assume that its estimate of initial capital costs has a relatively high degree of reliability, but its estimate of recurrent costs has the outward appearance of being extremely crude. The estimate of opportunity costs lies somewhere in between; it is built up from specific data and the method of calculation is exposed, but some of the basic assumptions are questionable.

In most educational cases it can be expected that recurrent costs will outweigh annual capital costs by a wide margin. Opportunity costs, on the other hand, may be relatively large or small, depending on the duration of the training, the level of the trainees, and what assumptions one makes about alternative employment conditions. Unfortunately it is usually easier to get relatively reliable and detailed estimates on capital outlays. Estimating recurrent costs and opportunity costs, on the other hand, is a much more speculative matter, requiring forecasts of wage relationships and employment conditions lying well into the future and subject to many unknown factors.

This being the case, it would seem prudent, first, to be as detailed and explicit as possible in revealing the basis for estimates of recurrent and opportunity costs, and second, to offer alternative projections which would reveal the sensitivity of the rate of return to variations in cost assumptions. Only in this manner is the reader of a cost-benefit analysis able to appraise it fairly and to select the alternative assumptions and projections which seem to him most plausible.

The second general point concerns the mission's confining its attention to the *incremental* costs involved in expanding Inacap training. This seems logical enough since the question at issue was whether the *additional* costs involved would be outweighed by the *additional* benefits secured, and by how much. On the other hand, the proposed expansion was more than a marginal affair; it entailed some-

thing like a doubling of these Inacap training programmes. It would not be surprising, therefore, if this large-scale expansion would have an impact, in one direction or another, on the cost structure of the existing training activities. To determine this, one would have to construct a composite picture of costs for the whole expanded programme—old plus new. This, of course, would be a much larger undertaking, and simply for purposes of making a rough-and-ready rate of return calculation the extra effort might not be warranted. But from the point of view of the local administrators of the project, who must be concerned not only with the rate of return and the decision to embark on the expansion, but with how to operate it most efficiently and effectively thereafter, a fuller picture of costs for the enterprise as a whole would be invaluable.

This leads to the third general point, concerning educational change and innovation and the internal efficiency of educational enterprises. The simplest approach to costing an educational expansion—and the one usually followed by economists—is to begin with the implicit assumption that the existing educational order is tolerably satisfactory, and mainly needs enlargement. This assumption avoids a great many technical difficulties and controversies. Its only trouble is that it is usually wrong. What the existing educational order really needs is not simply to be expanded but to be changed substantially in the process, in order to make it more efficient, more effective and more relevant to changing circumstances. Usually the easiest time to effect such changes and innovations—though it is never really easy—is when a new project is being put under way. This being the case, a cost-benefit analysis provides a good occasion for raising questions about the existing order and whether it might not be improved. Such improvements are likely to have implications for both costs and benefits; hence they should be considered in this context. Admittedly, this complicates the cost-benefit exercise, but the resulting benefits may far outweigh the additional effort involved.

In the present case, the report shows no indication that serious consideration was given to possible innovations in the Inacap programmes which might have favourably influenced the cost-benefit ratio. The mission was evidently satisfied with the efficiency and effectiveness of the current Inacap training programmes and was prepared to settle for a straightforward expansion. Since these programmes were relatively new in any event, and not bound by custom and tradition, this was perhaps an appropriate view. But if the project had, for example, involved an expansion of secondary education or of a university, this 'linear expansion' approach could be highly inappropriate in the long run—however high the theoretical rate of return might look in the short run.

E. Observations on capital costs

Here three points need to be made, concerning (i) the annual repayment of capital costs, (ii) the treatment of 'free' facilities, and (iii) the ability of the borrower to finance local currency costs.

As noted earlier, the report gave no annual figure for 'imputed rent to capital', and no explanation of how the mission treated interest charges. The following calculations of annual capital charges have, therefore, been made using the mission's gross capital figure and amortizing it over twenty years under three alternative interest assumptions:

Annual capital cost at:

0 per cent interest	\$189,090
6 per cent interest	\$315,966
10 per cent interest	\$444,186

The wide difference between repayments when the rate of interest is zero and when it is 6 or 10 per cent dramatizes how important the level of interest rates can be to an educational project.

According to the loan agreement between the bank and Inacap, the latter had to pay interest at the rate of 5.5 per cent per annum plus a commitment charge of 0.375 per cent per annum. This raises the general question of which interest rate should be taken into consideration in calculating annual costs, in those cases where the rate of interest of a special loan project differs from the long-term interest rate in the national market. More precisely, if such rate in Chile were in the order of 10 per cent, should it be ignored in the calculations and the imputed rent calculated with 6 per cent (5.5 per cent + 0.4)?

Basically the argument is much the same as with 'earnings forgone'; in either case it is an issue of 'opportunity costs'. If one is interested only in the project *budget*, then such opportunity costs can properly be ignored. But if the object is to calculate *all* the economic costs to society, then it would seem as appropriate to include 'interest forgone' on comparatively 'low interest' capital funds as to include earnings forgone, since the economy presumably could also have used the capital funds profitably in some other way.

The issue could be further complicated in the case where the capital lent at a comparatively low interest rate is supplied from *outside* the country. It is clear enough that the interest forgone represents an opportunity cost for *someone*. But for whom? Is it the donor member-countries of the loan institution? Or is it the borrower country—on the assumption that if the bank did not make this loan it would make an equivalent one for some other national project? Having posed the question, one can understand why the bank mission did not answer it.

The mission excluded from capital costs the value of industrial school facilities which were to be loaned free of charge to Inacap. The reason for this given in the report was that 'although the project makes use of capital investment previously made, there is no corresponding capital cost attributable to the project since these (industrial school facilities) represent "sunk" costs, i.e. costs already incurred whether the project is undertaken or not'.

But does it follow that the building, if not used by Inacap, would have no other valuable use? If it would have alternative uses, then its presumption by Inacap might force other potential occupants to invest freshly in alternative space, in which case there would be a real opportunity cost, chargeable to the Inacap project.

If, however, the building would otherwise stand idle, then the opportunity cost would be zero.

This is a minor point in the over-all arithmetic of the Inacap project, but it suggests a pertinent warning to educational administrators about offers they may receive for the 'free' use of facilities, of TV 'air time' or what not. Such things are seldom really 'free'. They may be free to the education budget, at least in the short run, but the chances are they are on somebody else's budget—if they are really worth using. And sooner or later they may end up in the education budget, meanwhile having imposed on it new recurrent costs far in excess of the cost of the 'free' facility or service.

Returning to capital costs, the mission's prudence in affirming that the borrowing agency was in a position to muster the local capital funds if the bank would provide the necessary foreign exchange funds must be noted. Two closely related questions, though not dealt with in the mission's report, are often even more important because the amounts involved are greater and more difficult to come by. First, how will this new external loan affect the borrowing country's future foreign exchange position, when the time comes to return it with interest? Second will the borrowing agency possess the necessary local resources, year after year, to cover the *recurrent* costs generated by the new project? In this particular case, which is perhaps not too atypical, recurrent costs *each year* (\$3,100,000) to be financed from local currency would be about *three times* the total local currency needed for the initial capital outlay (\$1,029,000). Thus the most pertinent question of all would seem to be not whether Inacap could somehow find the local capital funds needed initially, but whether it could obtain the much larger annual funds needed to cover future recurrent costs.

Here again this case suggests an important warning to educational authorities in developing countries. New capital facilities, furnished to an educational system by an outside donor or lender with the noblest of intentions, can have an adverse effect on the recipient country if the recurrent costs impose too great a burden.

F. Observations on recurrent costs

Stress has already been laid on the importance of recurrent costs to the rate of return in this and most other educational projects—a close examination of the structure and behaviour of recurrent costs is often a good way to discover potential educational economies and places where changes and innovations might yield high dividends. A good example of this is an unexplained paradox in the mission's report. It illustrates the sort of thing worth watching when evaluating the recurrent cost aspects of any project plan and any cost-benefit study.

The mission's report stated that in 1964-65 Inacap expected to turn out about 16,000 completed trainees and that the proposed expansion would add another 14,000 in future years, for a total of 30,000. Elsewhere the report stated that this expansion would require the addition of 224 part-time and full-time instructors to the 88 (not specified as to full-time or part-time) already on the job.

Putting these propositions together, it appears that 130 per cent expansion in man-hours of training would require roughly a 250 per cent expansion of the teaching staff. The report offers no explanation for this discrepancy, but one suspects that it is at least partially accounted for by the lack of strict comparability between the figures, and by a substantial change in the mix of evening and day students and the mix of full-time and part-time instructors. Also, over a third of the existing programme was taking place within existing factories using the staff of the factories on a part-time basis. However, all the new expansion would call for new institutions.

A check on unit costs per student was made which showed a marked decline in recurrent costs per student for the additional 14,000 trainees, in spite of the large increase in the number of teachers.¹ Since the report did not discuss unit costs, nor the number of students per faculty, nor teacher salaries, no further work could be done on this point. It serves to re-emphasize, however, the desirability of pressing the analysis of recurrent costs as far as possible when doing a cost-benefit analysis.

G. Observations on earnings forgone

Economists still disagree amongst themselves as to whether to include 'earnings forgone' as a proxy measure for opportunity costs in calculating the *social* rate of return on educational projects. Most are agreed that, in theory, it is appropriate to make allowance for such costs under economic circumstances of full or over-employment. But in practice, many argue, there is sufficient slack in the labour supply in most economies most of the time—especially in developing countries—so that the economy's real loss of output through the use of potential workers' time for training and education rather than for production is likely in fact to be far less than the theoretical calculations suggest, and many times it is nil.

In this particular case, the IBRD mission was strongly impressed by the indications of a shortage of skilled and semi-skilled workers in Chile—despite estimated over-all unemployment of the order of 5 per cent. On these grounds the mission went the full way in allowing for earnings forgone, assuming in effect that for every hour of training (even evenings) the economy lost an hour's worth of production.²

In the circumstances this was perhaps a defensible position to take, yet it might have been useful to present alternative assumptions and estimates as well, in order

1. From data given in the report, it was calculated that under the *existing* programme trainee-hours of instruction totalled 3,307,000 (in 1965) against total recurrent costs of \$3,991,336—or an average cost of \$1.21 per student hour. The *expansion* programme would increase student hours by 4,388,000, and recurrent costs by \$3,100,000—giving an average of only \$0.71 per student-hour of instruction. These calculations, it should be emphasized, are extremely crude and possibly far from the reality: particularly as the mission's report is not at all clear as to what exactly the 3,307,000 referred to, nor does it mention what proportion of the estimate is usually spent.

2. Even though in another part of the report the mission stated that 'in the main, during the evenings, there is not much sacrifice in incomes'.

to test their impact on the rate of return (and perhaps also to disarm potential critics who might feel that the full employment assumption was rather extreme). To illustrate the point, an alternative calculation was made, based on the following assumptions:

1. That 15 per cent of the unskilled workers entering the basic training course would be unemployed at the time; 10 per cent would become employed half-way through the training period; while 5 per cent would remain unemployed throughout.
 2. That of the 85 per cent actively employed workers entering the further training course, 25 per cent would be replaced by unemployed workers (thereby reducing the loss of production to the economy).
 3. That the skilled and semi-skilled workers taking evening training courses would otherwise have been working overtime only 75 per cent of the time (rather than 100 per cent); but offsetting this, they would be getting overtime wages 30 per cent higher than regular daytime rates (the mission assumed no overtime bonus).
- The combined effects of these adjustments are shown below (\$ thousands).¹

	Earnings forgone under:	
	Mission's assumptions	Adjusted Assumptions
(B) Trainees	390	238.9
(F) and (S) Trainees	530	492.7
Total earnings forgone	920	731.6

It will be seen that the modification of the mission's 'full employment' assumptions is likely to have only a slight impact on the 'rate of return' calculation—largely because the training period is short and earnings forgone represent a small part of total costs.

In contrast, however, as will be seen, the mission's 'full employment' assumption—as against an alternative 'partial unemployment' assumption—made a more important difference in the estimated size of benefits and thus on the rate of return.

III. The analysis of benefits

How much would over-all production of the Chilean economy benefit over the years from the investment in the expanded Inacap programme?

1. This includes as well an adjustment to account for wastage which partly offsets the previous adjustments. It has been assumed (see p. 351) that 15 per cent of day trainees and 7 per cent of evening trainees drop out in the middle of the course (the mission assumed a 100 per cent completion rate) and the mission's figures of earnings forgone have been reduced accordingly.

There is no ideal measure for these social benefits, and the mission had to make do with a proxy measure—namely, the differential earnings (that is, the *extra* lifetime income) that would accrue to trainees as the result of their training. This was admittedly an imperfect measure, for it is difficult to assess to what extent wages reflect each worker's marginal contribution to national production. In addition it was subject to many uncertainties of data and assumptions about the future. But it was the simplest measure available to the mission and the one most widely used by economists in such situations.

A. The mission's hypotheses and estimate

To construct its estimate of benefits, thus defined, the mission adopted the following specific hypotheses:

1. All trainees would finish their course, with their skills effectively improved.
2. Employers would in all cases recognize and utilize these improved skills and would promote and reward the trainees accordingly.
3. Following their training, all trained workers would work for twenty years, enjoying full employment.
4. Each trained worker's increased earnings would begin in the *second* year after his training, the first year being the period needed by employers for 'finishing' the workers to their specifications. Each man's wages would then move up to the next skill category and remain at least at this level for the balance of his working life.
5. The differential lifetime earnings calculated on the foregoing basis should be discounted by one-sixth to allow for a reduction in the work-week from six to five days.
6. A further discount of one-sixth should be made to allow for the fact that some of the trained workers would have eventually acquired nearly equivalent skills on the job of they had not taken the course.

In the above fashion, the mission calculated the lifetime earnings differentials shown in table 9, totalling \$3,250,000 per year.

In addition to these *direct* benefits, the report listed the following *indirect economic* benefits which would accrue to other persons and to the economy at large: (i) 'To the extent that the presence of trained, skilled workers makes possible the forming of new teams of workmen that include unskilled workers, a multiplying *employment effect* is felt, raising the nation's total employment and income'; and (ii) 'To the extent that the skills learned by the trainees *are transmitted* to their co-workers, the training contributes to the general raising of real income and welfare. Increased tax revenues attributable to the project...' would improve the government's fiscal position.

These indirect benefits, though not taken into account in the calculations, should be borne in mind in interpreting the results. It should be noted that from an

over-all *social* view it is implicitly assumed that the effects of the programme on third parties, such as other workers, would not offset those benefits accruing to the trainees.¹

TABLE 9. Annual earnings differentials attributed to the effects of Inacap training¹

Courses	No. of trainees ²	Rise in a trainee's earning (US \$)		Total US \$
		per day	per year	
Basic training	5 000	1.10 (1.05 to 2.15)	310	1 550 000
Further training	7 500	1.25 (2.90 to 4.15)	370	2 775 000
Specialization	1 500	1.25 (4.45 to 5.70)	370	555 000
TOTAL				4 880 000
Deductions				
1/6 for alternative on-the-job training				815 000
1/6 for decline in the duration of working week				815 000
TOTAL (after deductions)				3 250 000

NOTES 1. To accrue over twenty years, starting from the second year.
2. In round figures.

SOURCE An unpublished study by World Bank staff.

B. Commentary on benefits

The calculation of differential lifetime earnings is inherently a very speculative and risky exercise, subject to a wide margin of possible error. A change in any one of the key assumptions could alter the result considerably. It is important, therefore, to examine each assumption carefully, and it is prudent to consider a range of alternative possibilities. Four of the key assumptions are:

1. *Completion rate*: the mission's optimistic premise that *all* trainees would finish the course they started is at variance with the high drop-out rates experienced by voluntary adult education programmes the world over. Borus² found, for example, though in a quite different situation, a 20 per cent drop-out from a shorter (six-week) vocational course for unemployed workers. Much higher rates have been observed elsewhere. If it is assumed, optimistically, that as many as 85 per cent of B trainees and 93 per cent of evening trainees would complete their course, this modification alone would reduce the total estimated benefits by about 10 per cent.

1. For example, one of the implicit assumptions is that the trained workers will not displace other workers already employed.

2. M. E. Borus, 'A benefit-cost analysis of the economic effectiveness of retraining the unemployed' in *Yale economic essays*, Volume 4, number 2, Fall 1964.

2. *Promotions*: here again the mission was optimistic in assuming that all employers would recognize and make use of the newly acquired skills of the trainees and would raise their pay accordingly after one year. Platt and his colleagues¹ observed that 'there appears to be little follow-up of training earlier received at the centres operated by the Servicio—in general the employing organizations are not gaining full value from training'. It has been assumed, and it is a generous assumption, that only 90 per cent of those *completing* the course would get employment in training-related occupations or be upgraded as a result of the training experience, thus reducing annual economic benefits by another 10 per cent. Also one may go further, by asking for how long is the training received by the trained workers likely to fit into industrial needs. According to the highly practical nature of the courses, twenty years seems too long a period; ten years would appear as a more realistic assumption.
3. *Employment prospects*: the mission was equally optimistic in assuming that all trained workers would remain fully employed for the next twenty years. This assumption implies that the economy of Chile would grow steadily at a healthy rate and maintain a steady high rate of over-all employment, with no serious ups and downs. However, a more moderate assumption would seem more realistic. If one assumed, alternatively, a 3 per cent average of unemployment for the basic training (B) workers over the course of twenty years, this would reduce the benefit estimate of B trainees by a further 3 per cent, and that of all trainees by 1.2 per cent. This is in fact the minimum possible reduction. If there is to be some unemployment among semi-skilled workers in the future, it is likely that the wages of these workers will be lower than expected and thus, the reduction on the earning gains attributed to basic training workers would have to be more than 3 per cent.
4. *Wage increases*: the first problem here (which applies to earnings forgone as well) is that of data limitations. Educational planners almost everywhere are faced with insufficient data on workers' wages classified according to educational qualifications. Here, the authors had to use data on wages per occupational category. It should also be stressed that the mission did not state clearly how average wage rates were calculated. It is a fact that trained workers' wages are likely to vary according to their occupations and the industry and regions where they work. This adds another element of uncertainty, which has to be borne in mind when assessing the results. Wage increase is the most complex matter of all to deal with because it requires making forecasts not only of trends in the over-all level of real wages in the economy but also of trends in the *structure* of wages, and more particularly in the *relationships* between wages of unskilled, semi-skilled and skilled workers. In a growing, modernizing economy, these wage levels and relationships are almost certain to undergo substantial changes over the course of ten to twenty years, but it is virtually impossible to predict with any degree of precision the extent of such changes. On the other hand,

1. W. J. Platt *et al*, op. cit.

the *direction* of likely change is somewhat more predictable, on the basis of both economic knowledge and historical precedent. *In general*, one would expect, first, a gradual rise in average wages as the productivity of labour and of the whole economy improves; second, a gradual shift in the mix of jobs and in the composition of the labour force toward a higher proportion of semi-skilled and skilled jobs and workers; and third, a narrowing of the percentage spread between the wages of unskilled and skilled workers. In the present case the situation is further complicated by the nature of the Inacap project itself. It was designed to *accelerate* the expansion of supply of semi-skilled and skilled workers relative to the rising demands of the economy. In other words, it was aimed at overcoming the existing shortage. The wage differentials used by the mission for calculating benefits were rather high (see table 9) and likely to reflect the existing shortage. To the extent that the Inacap programme succeeded, the pressures for premium pay for qualified workers would diminish, and thus the future trained workers' gains would be over-estimated.

A further complication is that wages tend to rise with the age of the worker, usually reaching a peak around 40 to 45 years of age and thereafter levelling off or diminishing. To allow for this factor in the present case, one would have to have facts—or make assumptions—about the age profile of the Inacap trainees and the age-wage coefficients in Chile for the relevant occupations.

There is a final technical point to be considered regarding wages. The Inacap training was intended to help workers graduate from their present category into the next higher one. Since each category had its own range of wages, depending on the individual worker's experience and performance, the wage differential which an Inacap trained worker gained would depend on where he stood in the wage range of the category he left, and where he started out in the next category.

Though the report is not explicit on the point, it appears that the mission followed the moderate path of assuming (i) that the typical Inacap-trained worker, having already acquired some job experience, was at the *median* wage level in the skill category he left to enter training, and (ii) that after training he started at the *initial* wage level for the next category. Figure 1 illustrates the substantial difference which the above assumptions make in calculating the size of the earnings differential (depicted by the lines a) as compared to assuming that trainees moved directly from the *median* wage of one category to the *median* wage of the next category (lines b).

The mission was no doubt aware of the various factors that were likely to affect future wage levels and relationships, but appears to have decided that to take them all into account would not only complicate their task but, in view of the uncertainties, it would probably not significantly improve the accuracy of the final estimate of benefits.

For simplicity, the mission assumed that, for all practical purposes, the 1964 wage relationships, shown in table 9, would remain constant indefinitely. This crude assumption in effect allowed for no real increase in the earning differentials of trainees beyond the initial increase one year after their training.

Educational cost analysis in action: case studies for planners

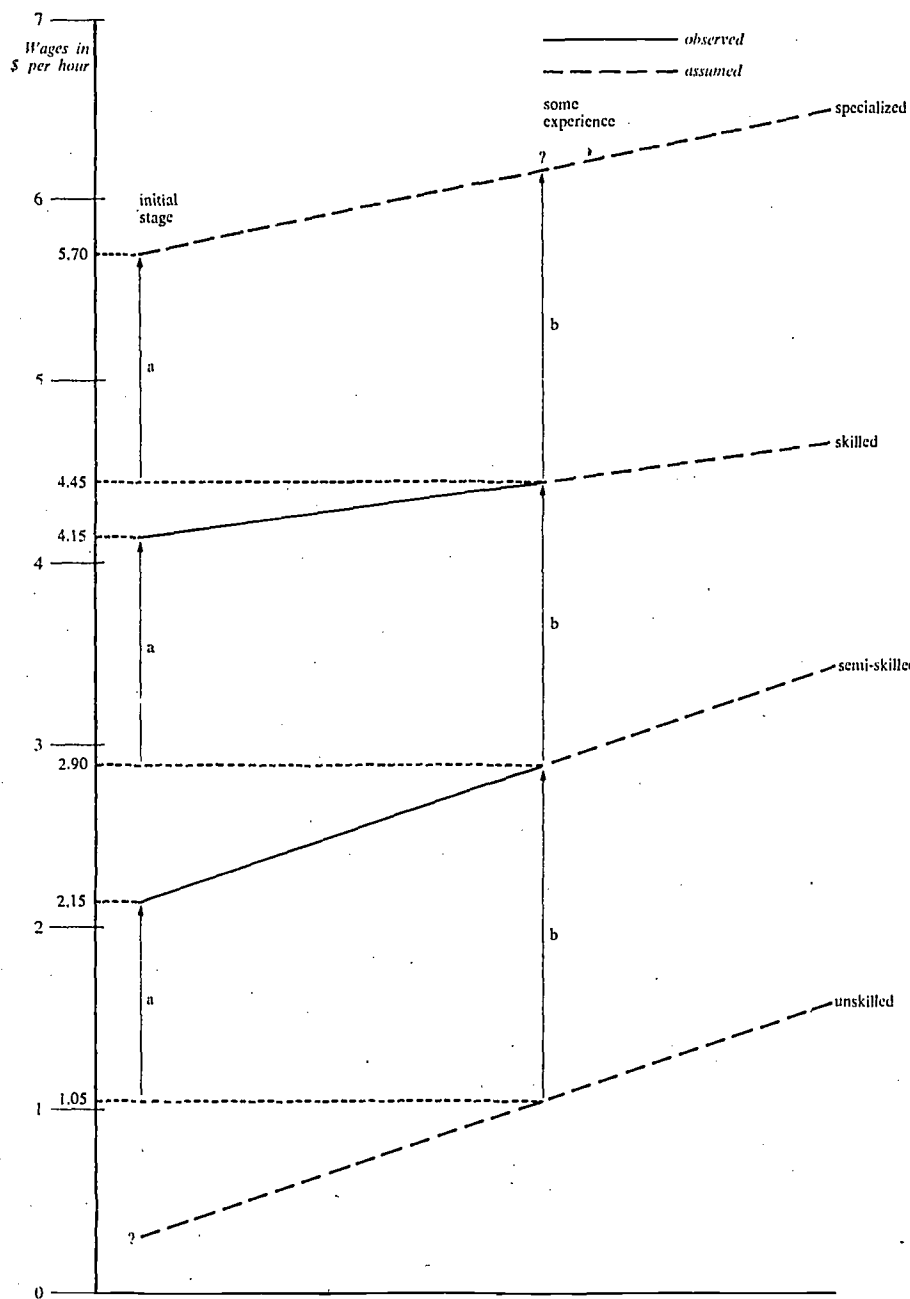


FIGURE 1. Increase in wage rates according to job experience.

Such an assumption was, on the one hand, on the conservative side since—as they acknowledged—they did not take into account factors such as age, experience and future increases in real wages, which could make the future earning gains of the trainees higher than expected. On the other hand, they were over-optimistic in that they did not consider that the differentials between the wages of unskilled and skilled workers are likely to be reduced in the future if Inacap programmes are successful.

5. *Deductions in benefits*:—was the mission correct in discounting estimated benefits by one-sixth on the assumption that some trained workers, even without Inacap training, would eventually acquire comparable skills on the job and be promoted? This raises an issue of great significance for all attempts at calculating the rate of return on a person's education. How much credit should schools, universities or special training programmes be given for the higher incomes which their 'graduates' subsequently earn?

Clearly the answer to this question is that they are owed some credit, but not all. The reason is that a person's employment opportunities, earnings and advancement are influenced not only by what he learns in school but by what he learns *outside* school, and by a complex of other factors—his family environment and background, his inherent intelligence, his interests, motivations, values, career aspirations and so forth. Thus, to credit his education with 100 per cent of his income differential over the incomes of persons with less education would clearly be wrong. It is therefore common practice to make an allowance for these non-educational factors in doing cost-benefit studies. The problem is *how much* allowance to make; unfortunately there is as yet no very satisfactory method for determining this, and so the allowance must be arbitrary. The mission allowed a discount of one-sixth.

IV. The rate of return

A. The mission's conclusion

As the culminating stage of its cost-benefits analysis, the IBRD mission calculated the 'rate of return' on the Inacap Project and emerged with the following conclusion:

'On the basis of the above assumptions, the internal rate of return of the project is in the neighbourhood of 50 per cent, which is a very high figure. From a strict economic standpoint, it may be even considered unreasonably high given the fact that the crucial inputs in the project are scarce local and foreign skills—not capital—valued at actual prices which probably do not reflect their true scarcity. Furthermore, it may be argued that the wage differentials assumed may not

properly reflect future economic conditions. On the other hand, the more intensive use of available capital resulting from the project, the accelerated and highly efficient methods of teaching employed, and the fact that the scope of the project has been designed within the bounds of conservatively estimated economic needs, go a long way in explaining the high return figure obtained. *These factors alone provide ample economic justification for undertaking the project.*

Table 10 reconstructs the arithmetic underlying this conclusion (substituting the calculations for annual capital costs at three alternative rates of interest, referred to earlier).

TABLE 10. Costs and benefits of one year (14,000 trainees) of the vocational training expansion programme (US\$)

	COSTS ¹			BENEFITS ²	
	With constant annual amortization of capital at interest rate of :			Rates of discount (percentage)	Present value
	0 %	6 %	10 %		
Imputed equipment and construction costs	189 090	315 966	444 186	46	4 836 000
Recurrent costs	3 250 000	3 250 000	3 250 000	47	4 699 500
Trainees' earnings forgone	920 000	920 000	920 000	48	4 566 250
TOTAL	4 359 090	4 485 966	4 614 186	49	4 449 250
				50	4 332 250

1. Costs in year 0.

2. Present value of additional life-time earnings at various discount rates.

In their calculations the mission used the *internal rate of return*, that is, the discount rate which equates the value of future benefits to present total costs per year.¹

B. Commentary on rate of return

A rate-of-return figure is the final product of a host of assumptions and estimates about costs and benefits, and accordingly shares their various strengths and weaknesses. It therefore seems wise to consider alternative assumptions at various

1. Mathematically, the rate of return is the solution value of r in the equation:

$$\sum_{t=0}^n \frac{E_t}{(1+r)^t} = \frac{C_t}{(1+r)^t}$$

where E is earnings differentials; C costs; and r the rate of interest. In this study the authors measured the rate of return for one year of the expansion programme. Therefore costs are incurred only in the year 0. It must be recalled that benefits accrue from $t = 2$ to $t = 20$.

key points in order to test the sensitivity of the rate of return to such variations, and also to give the reader the opportunity to choose those assumptions which strike him as being most plausible.

To illustrate how this works (but without claiming to reach a 'better' figure than the mission did, table 11 shows how certain of the alternative assumptions we have suggested earlier would alter the mission's rate of return.

A comparison of the two sets of hypotheses first confirms the point made earlier, that even substantial changes in estimates of annual *capital costs* (with varying rates of interest) do not greatly affect the final rate of return. This is likely to be the case in most if not all cost-benefit studies in the field of education. In the present case, a difference of more than 100 per cent in capital costs makes a two points difference in the rate of return.

TABLE 11. Social rate of return to one year of the expansion training programme (thousands of US\$)

Items	Alternatives	Hypothesis I Project's estimations	Hypothesis II
<i>Costs</i>			
Imputed capital costs ¹	1	189.1	189.1
	2	316.0	316.0
	3	444.2	444.2
Recurrent costs		3 250.0	3 250.6
Trainees earnings forgone		920	731.6
Basic training		390	238.9
Further training and specialization		530	492.7
Total costs	1	4 359.1	4 170.7
	2	4 486.0	4 297.6
	3	4 614.2	4 425.8
<i>Benefits</i>			
Earnings differentials to accrue from 2nd to 20th year		3 250.0	2 606.0 ²
Rates of return	1	49.7	44.5
	2	48.7	43.5
	3	47.7	42.5

NOTES 1. Three alternatives of capital costs are given according to table 10.

2. The \$250,000 figure has been reduced according to the assumptions made on wastage, future promotion and utilization of the training by the trained workers and unemployment as described in the text.

Alternative hypotheses on *recurrent costs*, on the other hand, could make a more significant difference. If it were assumed, for example, that the costs per trainee were 5 per cent higher (not included in table 11), mainly due to higher teacher salaries, the rate of return would be reduced by about 1.5 points.

The modifications suggested with respect to '*earnings forgone*' by the trainees also had little impact on the rate of return, again because, as in the case of capital costs, this factor played a relatively small role in total costs in this case. But in the

case of a university project involving a long period of training for relatively high-level personnel, the 'earnings forgone' figure might be proportionately much larger and alternative assumptions could produce a large change in the rate of return.

The greatest changes in the rate-of-return figure resulted from the alternative hypotheses with respect to the estimation of *benefits*—which are based on the more conservative assumptions about drop-outs, promotions and long-term employment prospects. It should be noted that these adjustments are partly offset by those in earnings forgone. The 20.5 per cent decrease in earnings forgone by itself makes the rate of return increase by 1.5 points. A similar reduction in annual benefits (19.8 per cent) taken separately makes for a 6.7 points decrease in the rate of return.

The results for a more pessimistic alternative, by assuming that annual benefits will be \$1,303,000, or only half those estimated in the second hypothesis, and that they will accrue over ten years instead of twenty, give a rate of return which is still very high: 19.5 per cent to 21.5 per cent. As a result of the discounting mechanism, the shortening of the 'benefit period' reduces the rate of return by only 2.3 points.

Despite the various adjustments, the resulting rate-of-return figures are in all events strikingly high. And it is to be remembered that in neither case has account been taken of the *indirect* economic benefits to the economy—which in a case of this sort could be very substantial. In short the alternative hypotheses tested here have not altered the basically favourable conclusion for decision-making purposes *in this particular case*. But in a more marginal case, it is clear that relatively few changes in assumptions could mean the difference between a favourable and an unfavourable decision on proceeding with the particular project.

V. Conclusions

What can be learnt from the Inacap experience about the contribution which cost-benefit analysis can make to the *selection*, *definition* and *appraisal* of educational projects, and also about the limitations of this type of analysis?

It has two evident virtues. First, it brings clearly into the open the essential logic by which the efficiency of any educational proposal should be appraised—not simply by whether it is needed and what it will cost, and not simply by the benefits it can bring, but *by the relationship of the one to the other*.

It is usually easy to demonstrate that an educational 'need' exists, especially in developing countries. But the real issue for planning and decision-making in such situations is how best to ration the available resources among the various needs so as to get optimum results. This requires asking with respect to any particular proposal whether its likely benefits will sufficiently outweigh its costs to make

it a relatively *better* investment than various alternative ways of spending the same resources. It also means asking whether the particular way proposed for meeting the particular need is the least costly among the available alternatives.

A second and closely related virtue is that it can prompt one to identify and examine the variety and potential repercussions of critical variables that are implicit in any important choice about educational development. It draws attention, for example, to the importance not only of present costs but of *future* cost commitments; to the impact which a given educational decision may have upon the labour market, production and people's incomes; and, conversely, to the effect of such economic variables on the performance of an educational project. These are facts which an educational administrator might easily overlook. Equally qualified experts may differ vigorously and widely about how these variables will behave in the future, but at least they can agree upon the basic logic and importance of taking these imponderables into careful account in reaching major decisions.

As regards the present study, legitimate doubts can be raised about a number of the major assumptions and estimates made in calculating both costs and benefits—particularly with respect to future wage relationships and employment prospects. The final rate-of-return figure was obviously much more sensitive to variations in some of these assumptions than others. For example, given the relative values of benefits, total costs and the various cost components, the rate of return was *in this case* much more sensitive to variations in benefits than in costs. It would have been an advantage had the study included a sensitivity analysis and offered a range rather than a simple set of critical assumptions on the most sensitive points. This is in general true for any sort of estimate such as the costing of an educational plan, manpower or enrolment forecasting, and so on. In this instance, the rate-of-return figure was so high that even a substantially modified set of assumptions might still have ended with an encouraging figure.

If, instead of being about 50 per cent, the rate of return had been only 15 to 20 per cent, as suggested by the more conservative assumptions, there would still have been a strong case for going ahead with the project. But suppose that in another situation the estimated rate of return was below 10 per cent, would this prove that the project was a poor investment and should be turned down? Not necessarily, for it must be remembered that the only thing being measured (i.e. estimated) is the *direct economic* benefits, and that even for this purpose private income benefits are being used as a rather dubious proxy-measure of society's direct economic benefits. The *indirect* economic benefits, and the *non-economic* benefits both to individuals and to society are ignored, and these may in some instances be considerable. But the latter benefits are far harder to identify, even theoretically, and one is thus left with only a *partial* measure of the total benefits and rate of return.

If all the foregoing limitations could be overcome, or at least sharply reduced by improved facts and more sophisticated methodologies, a cost-benefit analysis of the sort just examined could provide decision-makers with much more precise guidance on which specific educational *directions* to invest in at the moment.

But they would still have little guidance on *how much* to invest, which is usually their biggest problem. This is especially the case—as in the Inacap example—where a relatively large expansion project is likely, and indeed is *intended*, to change considerably the existing supply/demand relationships for particular types of manpower in the employment market. Such a change, being more than marginal, is likely to alter progressively prevailing wage differentials, by expanding supply more rapidly than demand grows. Thus, if one bases one's estimates of future benefits on *present* wage relationships and employment conditions one is quite certain of being wrong. Yet in the present state of the art of cost-benefit analysis this is standard practice, as there is no satisfactory way as yet to forecast the relative behaviour of supply and demand and the consequent impact on wage relationships. Cost-benefit analysis is a more reliable tool when applied to small-size educational projects, which would involve only marginal changes in the educational and occupational situation of a country, than in the present case.

It should be pointed out that even without the cost-benefit study, the manpower figures alone argued strongly in favour of the Inacap expansion. Therefore one is prompted to ask; why bother with the cost-benefit study? Was it not merely an elegant analytical exercise which started from a given set of estimates about manpower requirements and future employment conditions and which arrived by circuitous reasoning at an already *evident* conclusion? It does not seem so, since the cost-benefit study added two important dimensions to the purely 'manpower' approach; it investigated the whole matter of costs and of incomes. Conceivably the costs of expanding the supply of such manpower might have proved to be higher and the resulting additional income lower, so as to make the Inacap expansion seem a poor investment. In fact, of course, it showed quite the opposite.

The main conclusion which emerges from all these considerations is that cost-benefit analysis *can* be a useful tool for educational planning and decision-making, *when used in conjunction with other analytical tools and considerations*. No one of these tools—social demand analysis, manpower analysis or cost-benefit analysis—is by itself an adequate or totally reliable means of reaching a decision; all these methods of analysis added together, though they represent a considerable advance over the past, cannot give a foolproof answer. But what they *can* do is to provide the educational planner or decision-maker with a *better informed judgement*—still leaving him, however, to make the best judgement he can based on the best evidence at hand.

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